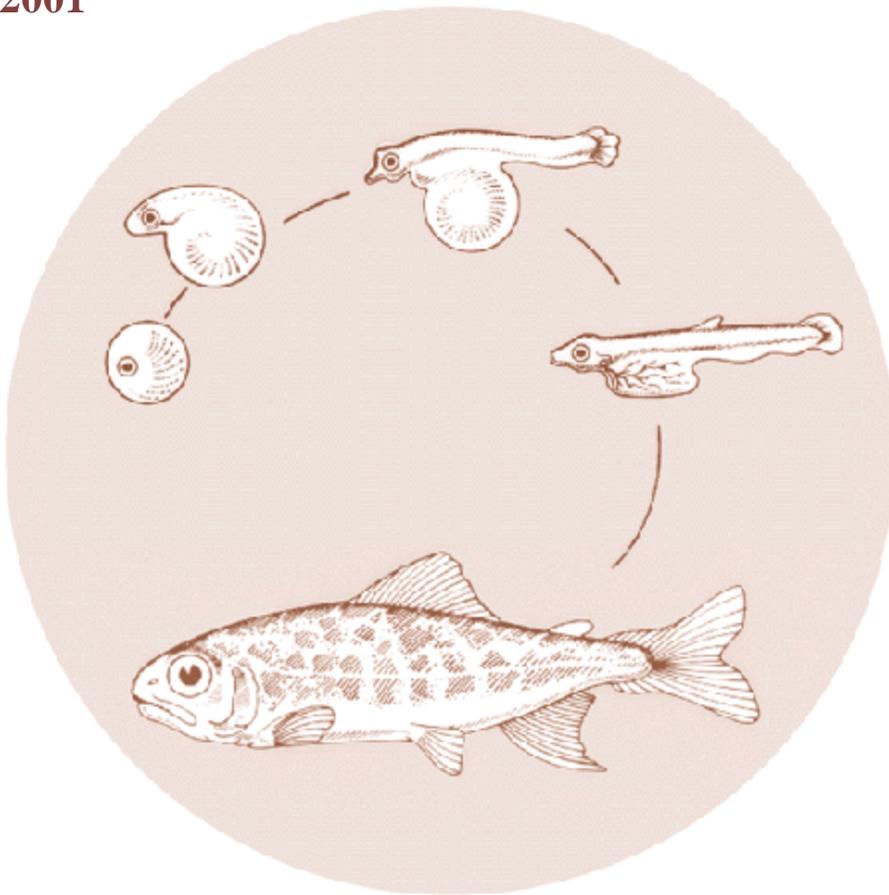


Umatilla Hatchery Satellite Facilities

Operations and Maintenance

Annual Report
2001



This Document should be cited as follows:

*Rowan, Gerald, "Umatilla Hatchery Satellite Facilities", Project No. 1995-06424, 59
electronic pages, (BPA Report DOE/BP-00004013-1)*

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views in this report are the author's and do not necessarily represent the views of BPA.

**UMATILLA HATCHERY SATELLITE FACILITIES
OPERATION AND MAINTENANCE**

ANNUAL REPORT 2002

Prepared by:

Gerald D. Rowan

Confederated Tribes of the Umatilla Indian Reservation
Department of Natural Resources
Fisheries Program

Prepared for:

U.S. Department of Energy
Bonneville Power Administration
Division of Fish and Wildlife
P.O. Box 3621
Portland, OR 97208-3621

Project Number 1983-435-00
Contract #4013

March 2003

Uploaded to BPA Web site May, 2003

ABSTRACT

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Oregon Department of Fish and Wildlife (ODFW) are cooperating in a joint effort to enhance steelhead and re-establish salmon runs in the Umatilla River Basin. As an integral part of this program, Bonifer Pond, Minthorn Springs, Imeqes C-mem-ini-kem, Thornhollow and Pendleton satellite facilities are operated for acclimation and release of juvenile summer steelhead (*Oncorhynchus mykiss*), fall and spring chinook salmon (*O. tshawytscha*) and coho salmon (*O. kisutch*). Minthorn is also used for holding and spawning adult summer steelhead and Three Mile Dam and South Fork Walla Walla facilities are used for holding and spawning chinook salmon. In some years, Three Mile Dam may also be used for holding and spawning coho salmon.

In the spring of 2002, summer steelhead were acclimated and released at Bonifer Pond (54,917), Minthorn Springs (47,521), and Pendleton (54,366). Yearling coho (1,621,857) were also acclimated and released at Pendleton. Yearling spring chinook salmon (876,121) were acclimated and released at Imeqes C-mem-ini-kem. At Thornhollow, 520,564 yearling fall chinook and 307,194 subyearling fall chinook were acclimated. In addition, 104,908 spring chinook were transported to Imeqes C-mem-ini-kem in November for release in the spring of 2003.

CTUIR and ODFW personnel monitored the progress of outmigration for juvenile releases at the Westland Canal juvenile facility. Nearly all juveniles released in the spring migrated downstream prior to the trap being opened in early July.

A total of 100 unmarked and 10 marked summer steelhead were collected for broodstock at Three Mile Dam from September 21, 2001, through April 2, 2002. An estimated 180,955 green eggs were taken from 36 females and were transferred to Umatilla Hatchery for incubation and rearing.

A total of 560 adult and 26 jack spring chinook salmon were collected for broodstock at Three Mile Dam from April 22 through June 12, 2002, and were transported to South Fork Walla Walla. An estimated 1,017,113 green eggs were taken from 266 females and were transferred to Umatilla Hatchery. Excess unmarked broodstock (seven adult males, five jacks, and 34 females) were released into the South Fork Walla Walla River at the end of spawning.

A total of 168 adult and eight jack spring chinook salmon were transferred from Three Mile Dam to South Fork Walla Walla between June 6 and June 23 for temporary holding. On August 8, 154 adults and eight jacks were released into the South Fork Walla Walla River to spawn naturally.

A total of 214 adult spring chinook salmon were transferred from Ringold Hatchery to South Fork Walla Walla between June 7 and June 20 for temporary holding. On August 8, 171 were released into natural production areas in the Walla Walla River basin to spawn naturally.

A total of 525 adult and 34 jack fall chinook salmon were collected and held for broodstock at Three Mile Dam from September 16 to November 17, 2002. An estimated 678,122 green eggs were taken from 183 females. The eggs were transferred to Umatilla Hatchery. Coho salmon broodstock were not collected in 2002.

Personnel from the ODFW Eastern Oregon Fish Pathology Laboratory in La Grande took samples of tissues and reproductive fluids from Umatilla River summer steelhead and spring and fall chinook salmon broodstock for monitoring and evaluation purposes. Infectious hematopoietic necrosis virus (IHNV) was detected in five of 68 spawned summer steelhead. Summer steelhead were not examined for bacterial kidney disease (*Renibacterium salmoninarum*; BKD) in 2002. Infectious hematopoietic necrosis virus was detected in 27 of 78 spawned spring chinook females. Two hundred sixty-six spawned spring chinook females were sampled for BKD and two had low to moderate levels of Rs antigen (ELISA OD₄₀₅ readings of 0.260 and 0.365). All others had low to negative levels of Rs antigen (ELISA OD₄₀₅ readings of 0.00 to 0.099). Twenty-one spring chinook mortalities were examined for culturable bacteria and enteric redmouth disease (*Yersinia ruckeri*) was detected in one fish. Cell culture assays for replicating viral agents on spawned fall chinook were negative. One hundred eighty-three spawned fall chinook females were sampled for BKD and all had ELISA readings between 0.00 and 0.099, indicating negative to low level positives. Two fall chinook mortalities were examined for BKD and both had OD₄₀₅ readings of less than 0.099, indicating negative to very low levels of Rs antigen.

Regularly scheduled maintenance of pumps, equipment, and facilities was performed in 2002. Critical maintenance and repair was also performed by Umatilla Passage Facility Operation and Maintenance crews.

ACKNOWLEDGEMENTS

Bonneville Power Administration (BPA) funded this project. The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) thank Jonathan McCloud, Jay Marcotte and other BPA personnel for their assistance. Thanks are extended to Mike Gribble, Jack Hurst, Sam Onjukka, Glenda Claire, Brett Farman, and other Oregon Department of Fish and Wildlife (ODFW) personnel for providing assistance in the spawning of summer steelhead and spring and fall chinook salmon and for monitoring the fish for the presence of pathogens. Bill Duke (ODFW) assisted with collection and transport of steelhead and chinook salmon broodstock and collection of data at Three Mile Dam and Westland Canal. Bob Becker (ODFW) supervised and coordinated fish transfers to the acclimation facilities. Thanks go to Dale Chess, Wes Stonecypher, Will Cameron, and Andrew Berger (ODFW) for sharing their juvenile pre-release data and for assisting in the collection of broodstock data. We thank landowners Rosemary and Wes Gladow and Richard Kaye for their cooperation and Union Pacific Railroad for providing access to the facilities. Thanks are also extended to the Umatilla Basin Fish Facilities Operation and Maintenance crew for helping to maintain the facilities.

Thanks go to the CTUIR staff for their cooperation and contributions to this report. Brian Zimmerman, Preston Bronson, Brian Conner, Larry Cowapoo, Vern Spencer, and Joe Spicer collected data from adults returning to Three Mile Dam and assisted in the collection and transport of steelhead and chinook salmon broodstock. Paul Kissner and other biologists and technicians collected data and snouts from spawning ground and creel surveys. Michelle Thompson provided the administration of the agreement and Julie Burke, Celeste Reves, and Esther Huesties provided office management and secretarial services. Gary James and Brian Zimmerman provided technical oversight and critical review of this report and Craig Contor also provided critical review.

Thanks go to Chris Dearing, Mike McCloud, Louis Case, Melvin Farrow, Tysen Minthorn, and Tela Branstetter for the long hours and weekends spent operating and maintaining the facilities and for collecting data.

TABLE OF CONTENTS

ABSTRACT	ii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	x
INTRODUCTION	
Background	1
Facility Descriptions and Operations	1
Project Objectives	4
METHODS	
Objective 1: Adult Survival and Homing	
Task 1.1: Juvenile Holding	
Task 1.2: Juvenile Outmigration Monitoring	
Task 1.3: Juvenile Acclimation Facility Maintenance	
Objective 2: Adult Holding and Spawning	
Task 2.1: Adult Collection, Holding and Spawning	
Collection, Holding and Spawning of Summer Steelhead	
Collection, Holding and Spawning of Spring Chinook Salmon	
Collection, Holding and Spawning of Fall Chinook Salmon	
Collection, Holding and Spawning of Coho Salmon	
Task 2.2: Disease Sampling	
Disease Sampling of Summer Steelhead Broodstock	
Disease Sampling of Spring Chinook Salmon Broodstock	
Disease Sampling of Fall Chinook Salmon Broodstock	
Disease Sampling of Coho Salmon Broodstock	
Task 2.3: Adult Holding and Spawning Facility Maintenance	
Objective 3: Increased Spring Chinook Salmon Production	
Task 3.1: Increased Spring Chinook Salmon Production	
Objective 4: Increased Adult Spring Chinook Spawners	
Task 4.1: Holding and Outplanting Spring Chinook Salmon	
Objective 5: New Umatilla Satellite Facilities	
Task 5.1: Umatilla Satellite Facilities Review and Comment	

TABLE OF CONTENTS (cont.)

RESULTS AND DISCUSSION

Objective 1: Adult Survival and Homing
Task 1.1: Juvenile Holding
 Acclimation and Release of Juvenile Salmonids
 Acclimation at Bonifer
 Acclimation at Minthorn
 Acclimation at Thornhollow
 Acclimation at Imeques C-mem-ini-kem
 Acclimation at Pendleton
Task 1.2: Juvenile Outmigration Monitoring
Task 1.3: Juvenile Acclimation Facility Maintenance
Objective 2: Adult Holding and Spawning
Task 2.1: Adult Collection, Holding and Spawning
 Collection, Holding and Spawning of Summer Steelhead
 Collection, Holding and Spawning of Spring Chinook Salmon
 Collection, Holding and Spawning of Fall Chinook Salmon
 Collection, Holding and Spawning of Coho Salmon
Task 2.2: Disease Sampling
 Disease Sampling of Summer Steelhead Broodstock
 Disease Sampling of Spring Chinook Salmon Broodstock
 Disease Sampling of Fall Chinook Salmon Broodstock
 Disease Sampling of Coho Salmon Broodstock
Task 2.3: Adult Holding and Spawning Facility Maintenance
Objective 3: Increased Spring Chinook Salmon Production
Task 3.1: Increased Spring Chinook Salmon Production
Objective 4: Increased Adult Spring Chinook Spawners
Task 4.1: Holding and Outplanting Spring Chinook Salmon
Objective 5: New Umatilla Satellite Facilities
Task 5.1: Umatilla Satellite Facilities Review and Comment

LITERATURE CITED

APPENDICESA-1

LIST OF TABLES

Number	Page
1.	Juvenile fall and spring chinook salmon releases in the Umatilla River Basin (1982-2002)
2.	Hatchery releases of fall chinook salmon in the Umatilla River Basin
3.	Hatchery releases of spring chinook salmon in the Umatilla River Basin
4.	Hatchery releases of summer steelhead in the Umatilla River Basin
5.	Juvenile summer steelhead and coho salmon releases in the Umatilla River Basin (1981-2002)
6.	Hatchery releases of coho salmon in the Umatilla River Basin
7.	Juvenile salmon and summer steelhead releases in the Umatilla River Basin in 2002
8.	Food rations, mortalities, temperatures and DO concentrations during acclimation of juvenile summer steelhead, coho, and spring and fall chinook salmon at Bonifer, Minthorn, Thornhollow, Imeques C-mem-ini-kem, and Pendleton acclimation facilities in 2002
9.	Size at release for juvenile summer steelhead, coho, and spring and fall chinook salmon released in the Umatilla River Basin in 2002
10.	Estimated number of fish captured at the Westland Canal juvenile facility in 2002
11.	Summer steelhead broodstock collection, spawning and mortality in 2001-2002
12.	Spring chinook salmon broodstock collection, spawning and mortality in 2002.....
13.	Fall chinook salmon broodstock collection, spawning and mortality in 2002
14.	Results of disease sampling of Umatilla River summer steelhead, and spring and fall chinook salmon broodstock in 2002

LIST OF FIGURES

Number	Page
1.	Confederated Tribes of the Umatilla Indian Reservation and Bonifer, Minthorn, Imeqes C-mem-ini-kem, Thornhollow, Pendleton, Three Mile Dam and South Fork Walla Walla satellite facilities
2.	Length frequency distribution of juvenile summer steelhead released at Bonifer Acclimation Facility between 4/2 and 4/9/02
3.	Length frequency distribution of juvenile summer steelhead released at Minthorn Acclimation Facility between 4/24 and 4/30/02.....
4.	Length frequency distribution of juvenile fall chinook salmon released at Thornhollow Acclimation Facility between 3/1 and 3/7/02
5.	Length frequency distribution of juvenile fall chinook salmon released at Thornhollow Acclimation Facility between 4/4 and 4/11/02
6.	Length frequency distribution of juvenile fall chinook salmon released at Thornhollow Acclimation Facility between 5/17 and 5/23/02.....
7.	Length frequency distribution of juvenile spring chinook salmon released at Imeqes mem-ini-kem Acclimation Facility between 2/2 and 2/7/02
8.	Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem Acclimation Facility between 3/1 and 3/8/02
9.	Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem Acclimation Facility between 3/1 and 3/8/02
10.	Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem Acclimation Facility between 3/1 and 3/8/02
11.	Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem Acclimation Facility between 3/8 and 3/14/02
12.	Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem Acclimation Facility between 4/4 and 4/11/02
13.	Length frequency distribution of juvenile summer steelhead released at Pendleton Acclimation Facility between 4/24 and 4/30/02.....

LIST OF FIGURES (cont.)

Number		Page
14.	Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility between 3/2 and 3/7/02	
15.	Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility between 3/2 and 3/7/02	
16.	Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility on 3/29/02	
17.	Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility between 4/5 and 4/17/02	

APPENDICES

Number	Page
A. Liberation information for summer steelhead, fall and spring chinook and coho salmon coded-wire tagged and released in the Umatilla River Basin in 2002	A-1
B. Fish sampled at the Westland Canal juvenile facility in 2002	B-1
C. Umatilla River summer steelhead broodstock collection in 2001-2002	C-1
D. Summer steelhead broodstock spawning at the Minthorn adult holding and spawning facility in 2002	D-1
E. Spring chinook salmon broodstock spawning and mortality at South Fork Walla Walla in 2002	E-1
F. Fall chinook salmon broodstock spawning and mortality at Three Mile Dam in 2002	F-1

INTRODUCTION

Background

The Umatilla River Basin historically supported large runs of anadromous salmonids, including summer steelhead (*Oncorhynchus mykiss*), fall and spring chinook salmon (*O. tshawytscha*) and coho salmon (*O. kisutch*). The runs of chinook and coho salmon were essentially eliminated in the early 1900's. The losses have generally been attributed to the development of hydroelectric dams and to forestry, agriculture, and irrigation practices. The single indigenous naturally spawning anadromous stock left in the Umatilla River Basin is a run of summer steelhead.

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Oregon Department of Fish and Wildlife (ODFW) began efforts to enhance steelhead and re-establish salmon runs in the Umatilla River Basin in the early 1980's. As an integral part of these efforts, Bonifer Pond (Bonifer), Minthorn Springs (Minthorn), Imeques C-mem-ini-kem (Imeques), Thornhollow, Pendleton, Three Mile Dam and South Fork Walla Walla satellite facilities were constructed. The facilities are administered under the Fish and Wildlife Program of the Northwest Power Planning Council and are funded by Bonneville Power Administration (BPA).

The facilities are operated by CTUIR in cooperation with ODFW. Bonifer, Minthorn, Imeques, Thornhollow, and Pendleton facilities are operated for acclimation and release of juvenile salmon and summer steelhead. The main goal of acclimation is to reduce stress from trucking prior to release and improve imprinting of juvenile salmonids in the Umatilla River Basin. Minthorn is also used for holding and spawning summer steelhead and Three Mile Dam and South Fork Walla Walla facilities are used for holding and spawning fall and spring chinook salmon. In some years, coho salmon may also be held and spawned at Three Mile Dam.

This report details activities associated with operation and maintenance of the Bonifer, Minthorn, Imeques, Thornhollow, Pendleton, Three Mile Dam and South Fork Walla Walla facilities in 2002.

Facility Descriptions and Operations

The Bonifer facility is located adjacent to Meacham Creek at rivermile (RM) 2 (Figure 1). The pond spills into Boston Canyon Creek, which flows approximately 20 yards before entering Meacham Creek. Meacham Creek flows into the Umatilla River at RM 79. The facility consists of a 1.75-acre earthen pond and concrete water outlet control structure which also functions as a fish trap. The pond holds approximately 4.5 acre-feet of water and is fed by three nearby springs. Flows range from approximately 750 to 1,850 gallons per minute (gpm). Operations began in 1984.

The Minthorn facility is located approximately four miles east of Mission, Oregon (Figure 1). The facility is located on Minthorn Springs Creek, which is formed from the inflow of several springs located immediately south of the Umatilla River. The creek is approximately one mile long, with the facility located near the mouth at Umatilla RM 63.8. The facility includes two raceways

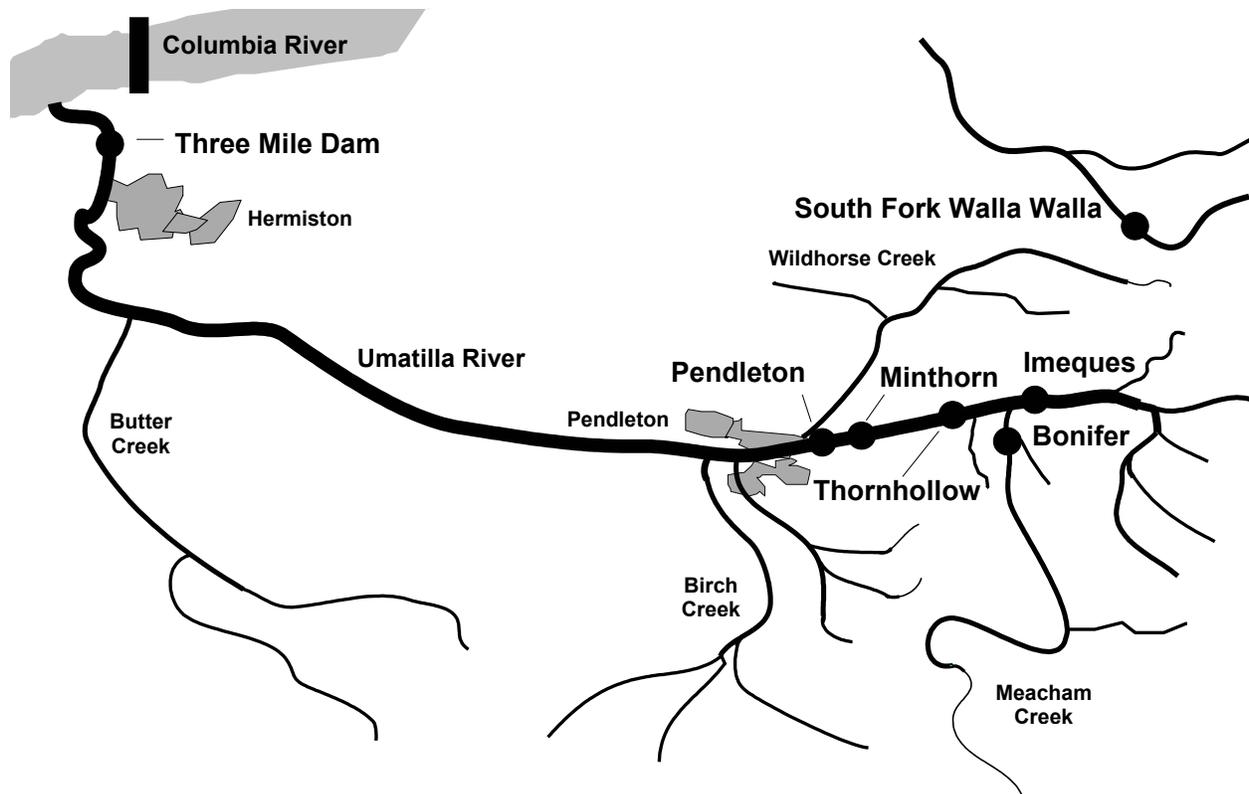


Figure 1. Three Mile Dam, Pendleton, Minthorn, Thornhollow, Imeques C-mem-ini-kem, Bonifer, and South Fork Walla Walla satellite facilities.

(each 120 x 12 x 4 feet), pump station, standby generator and water outlet control structure, which also functions as a fish trap and summer steelhead broodstock holding area. Water through the brood holding area is supplied by gravity and ranges from approximately 500 to 2,100 gpm. Water supply to the raceways is pumped from the creek. Water depth is usually held at three feet with a single-pass water pumping rate of 800 gpm through each raceway. Two valves control the effluent water to allow for either recycling of flows into the intake pond or discharge downstream of the intake and adult holding area. Minthorn was first operated in 1986.

The Imeques facility is located on the upper Umatilla River at RM 79.5 (Figure 1). The facility includes a water intake structure with automatic screen cleaner, water headbox/distribution system, storage building, four acclimation ponds (approximately 13,000 cubic feet each) and water outlet and fish release structure. Water is supplied by gravity flow (approximately 1,600 gpm per pond). Imeques C-mem-ini-kem was completed and began operations in 1994.

The Thornhollow facility is located on the upper Umatilla River at RM 73.5 (Figure 1). The facility includes a water intake structure with automatic screen cleaner, pump station, standby generator, water headbox/distribution system, storage building, two acclimation ponds (approximately 13,000 cubic feet each) and water outlet and fish release structure. Water is supplied by gravity flow to the pump station where it is pumped into the headbox. Water flow is approximately 1,600 gpm per pond. Thornhollow was completed and began operations in 1995.

The Pendleton facility is located on the upper Umatilla River at RM 56 (Figure 1). The facility includes a water intake structure with automatic screen cleaner, pump station, standby generator, water headbox/distribution system, storage building, four acclimation ponds (approximately 13,000 cubic feet each), settling pond for pond cleaning, and water outlet and fish release structure. Water is supplied by gravity flow to the pump station where it is pumped into the headbox. Water flow is approximately 1,600 gpm per pond. The facility was completed and began operations in 2000.

The Three Mile Dam facility is located on the lower Umatilla River at approximately RM 4 (Figure 1). The facility includes a water intake system with automatic screen cleaning, pump station having a pumping capacity of 8,000 gpm, six adult holding ponds (each 90 x 10 x 6 foot effective water depth), mechanical fish crowder, visitor facilities including restrooms, standby generator and chemical storage, bunkhouse and spawning buildings. The bunkhouse includes two bunkrooms, kitchen area, office space, conference room, shop, and restrooms. The spawning building includes a fish lift, electroshock anesthesia system, sorting and spawning facilities, wet and dry storage rooms, walk-in cooler, and restroom.

The South Fork Walla Walla facility is located east of Milton-Freewater, Oregon (Figure 1). The facility is located on the South Fork of the Walla Walla River at approximately RM 7. The facility includes a water intake system with automatic screen cleaning, pump station having a pumping capacity of 8,700 gpm, ozone water treatment system, settling pond, five adult holding ponds (each 90 x 10 x 6 foot effective water depth), mechanical fish crowder, standby generator, chemical storage and spawning buildings and two homes for nite watch personnel. The spawning building includes a fish lift, electroshock anesthesia system, sorting and spawning facilities, wet and dry storage rooms, walk-in cooler/freezer, and restroom and office space.

Project Objectives

The following project objectives for 2002 are part of overall objectives to operate and maintain the satellite facilities:

- Objective 1: Increase adult salmon and steelhead survival and homing to the Umatilla River basin.
 - Task 1.1: Hold and feed juvenile salmon and summer steelhead in facilities prior to release in the Umatilla River basin.
 - Task 1.2: Determine trends in juvenile outmigration timing.

- Task 1.3: Maintain the facilities in good working order.
- Objective 2: Provide summer steelhead, spring and fall chinook and coho salmon eggs to Umatilla and other hatcheries for incubation, rearing and later release in the Umatilla River basin.
 - Task 2.1: Collect, hold and artificially spawn summer steelhead, spring and fall chinook and possibly coho salmon as well as collect physical data.
 - Task 2.2: Assist ODFW in collecting samples from prespawn mortalities and spawned fish for disease analysis.
 - Task 2.3: Maintain the facilities in good working order.
- Objective 3: Increase production of Carson stock spring chinook for release in the Umatilla River.
 - Task 3.1: Provide funding for the United States Fish and Wildlife Service to produce 350,000 spring chinook salmon for release in the Umatilla River. The funding includes fin marking and coded-wire tagging costs.
- Objective 4: Increase the number of spring chinook adult spawners in the Umatilla and Walla Walla River basins.
 - Task 4.1: Temporarily hold adult spring chinook salmon for later outplanting in the Umatilla and Walla Walla River basins.
- Objective 5: Participate in planning and review process for new Umatilla Hatchery supplement and the new NEOH/Walla Walla Hatchery.
 - Task 5.1: Review and comment on engineering designs and follow up with engineers as necessary during planning and construction of incubation and rearing facilities planned at the South fork Walla Walla Facility.

METHODS

Objective 1: Adult Survival and Homing

Task 1.1: Juvenile Holding

Juvenile summer steelhead, coho, and spring and fall chinook salmon were transported by ODFW to the acclimation facilities using 3,000 and 5,000 gallon fish transport trucks. Proposed acclimation periods for fish released in the spring were three weeks for fall chinook subyearlings and four weeks for coho, spring and fall chinook yearlings, and summer steelhead. Fish received in the fall are scheduled for release in the spring of 2003. The fish were fed Biomoist Feed (Bio-Oregon Inc., Warrenton, Oregon) twice each day. Fish were to be fed at a rate of approximately 0.5 to 1.5% body weight per day (BWD). Mortalities were removed daily and ODFW pathology personnel were available to address specific disease concerns.

The total number of fish released was estimated using ODFW Fish Liberation Reports and acclimation mortality records. The number of fish tagged was estimated using ODFW Coded-Wire Tagging Operation Summaries, hatchery and acclimation mortality records, and tag retention sampling prior to release.

Oregon Department of Fish and Wildlife personnel sampled all summer steelhead, and fall and spring chinook salmon groups the day of release for weight and fork length. CTUIR personnel sampled coho juveniles the day of release for weight and fork length.

Temperature and dissolved oxygen (DO) measurements were taken at the facilities during acclimation. Temperatures were recorded hourly by automatic temperature recorders (Vemco Minilog). Dissolved oxygen measurements were taken daily with a YSI portable DO meter.

Task 1.2: Juvenile Outmigration Monitoring

Juvenile salmonids were collected at the Westland Canal juvenile facility (RM 27) during trapping operations. The trap was monitored daily and fish were hauled as necessary by CTUIR and ODFW Fish Passage personnel (Zimmerman et al. 2002). The trap is located approximately 29.0, 36.8, 46.5, 52.5, and 54.0 rivermiles downstream from Pendleton, Minthorn, Thornhollow, Imeques, and Bonifer, respectively.

Juveniles were sampled each day fish were hauled during the juvenile trapping period. Species and marks were recorded on all fish and lengths were recorded on a portion of the salmonids. Weight samples were taken using standard hatchery practices to estimate the average size of the fish. The weight samples were used to estimate the total number of fish hauled on sampling days by multiplying the number of fish per pound by the number of pounds loaded.

Task 1.3: Juvenile Acclimation Facility Maintenance

Regularly scheduled maintenance of pumps, equipment, and facilities was performed in 2002. Critical maintenance and repair was also performed by Umatilla Passage Facility Operation and Maintenance crews.

Objective 2: Adult Holding and Spawning

Task 2.1: Adult Collection, Holding and Spawning

Collection, Holding and Spawning of Summer Steelhead

Summer steelhead were collected for broodstock through the cooperative efforts of CTUIR and ODFW. Fish were trapped at Three Mile Dam, located approximately three miles upstream from the mouth of the Umatilla River, and were transported to Minthorn by CTUIR and ODFW Fish Passage personnel using a 370 gallon fish transport tank.

The broodstock goal was 110 adults. To help maintain the genetic integrity of the hatchery population, the first priority for broodstock was to collect 100 unmarked fish at a male to female ratio of 1:1. Fish were collected throughout the run to provide a representative cross-section of the population. To allow for male mortality, coded-wire tagged hatchery males (adipose and left ventral clipped) were also collected throughout the run.

Beginning February 15, 2002, and continuing through June 3, broodstock were treated three times per week with hydrogen peroxide (VOPAK USA, Spokane, WA.) to help control fungus. A one-hour flow-through treatment using 3.4 to 8.4 gallons of hydrogen peroxide was used.

Beginning April 3, broodstock were sorted weekly to determine maturation. Ripe fish were spawned by CTUIR and Umatilla Hatchery personnel using standard hatchery practices. A 3 x 3 spawning matrix was used whenever possible and matings were random. Eggs from each family group were water hardened in iodophor (Argentynite, Argent Chemical Laboratories) at 75 ppm for one hour and transferred to Umatilla Hatchery for incubation and rearing.

After the spawning season was completed, all remaining adipose and left ventral clipped fish were sacrificed for tag recovery. Unmarked fish were released back into the Umatilla River. Fork and MEHP lengths were taken on prespawn mortalities, spawned fish and excess fish sacrificed. MEHP length was defined as the distance from the middle of the eye to the end of the hypural plate. Fin marks were recorded and snouts were collected from all coded-wire tagged fish. Scale samples were also collected from both hatchery and unmarked fish.

Collection, Holding and Spawning of Spring Chinook Salmon

Spring chinook salmon broodstock were also collected at Three Mile Dam. The goal was to collect 560 adult broodstock at a female to male ratio of 1:1. Jacks were also collected at a rate of

one jack for every 10 adult males collected. Fish Passage personnel transported fish to the South Fork Walla Walla facility using a 3,000 gallon fish transport truck.

On the day of collection, each fish was injected with Oxytetracycline 100 and Erythromycin 200 at a rate of approximately 10mg/kg/fish. The fish were given a second injection at the same dosage rate on July 1 and 2 at South Fork Walla Walla. Beginning May 8 and continuing through the end of the spawning season, broodstock were treated with formalin three times per week to help control fungus. A one-hour flow-through treatment at approximately 167 ppm was used.

Beginning August 21, fish were sorted and spawned once per week by CTUIR and ODFW personnel. A spawning ratio of 1:1 was utilized whenever possible, but due to a shortage of males on the last spawn day, a ratio of two males to four females was also used. The eggs from each female were fertilized individually and the eggs from four females were pooled to form one family group. The eggs were water hardened in iodophor at 75 ppm and transferred to Umatilla Hatchery.

Fork and MEHP lengths were taken on prespawn mortalities and spawned fish. Fin marks were recorded and snouts were collected from all coded-wire tagged fish. Scale samples were also collected from unmarked fish.

Collection, Holding and Spawning of Fall Chinook Salmon

Fall chinook salmon broodstock were collected and held at Three Mile Dam. The initial collection rate was 100% of the total adult return by trapping period and at a male to female ratio of 1:1. The collection rate was adjusted as necessary to provide the goal of 470 adults. Jacks were also collected at a rate of one for every 10 adult males.

Fall chinook broodstock collected from September 16 to September 30 were injected with both Oxytetracycline and Erythromycin on October 1 and at a rate of approximately 10mg/kg/fish. Fish collected from October 1 through November 1 were injected at the time of collection. Fish collected after November 1 were not injected.

Beginning October 3 and continuing through November 12, the fish were treated two days per week with hydrogen peroxide to help control fungus. A flow through treatment at approximately 100 ppm active ingredient was used.

Beginning November 6, fish were sorted and spawned once or twice per week by CTUIR and ODFW personnel. A spawning ratio of 1:1 was utilized whenever possible, but after fertilization, the eggs from four females were pooled to form one family group. The eggs were water hardened in iodophor at 75 ppm and transferred to Umatilla Hatchery for early incubation.

After the spawning season was completed, remaining coded-wire tagged fish were sacrificed for coded-wire tag recovery and unmarked fish were released back into the Umatilla River. Fork and MEHP lengths were taken on prespawn mortalities, spawned fish and excess fish sacrificed. Fin marks and the presence of blank-wire tags were recorded and snouts were collected from all coded-wire tagged fish. Scale samples were also collected from unmarked fish.

Collection, Holding and Spawning of Coho Salmon

Coho salmon broodstock were not collected in 2002. Oregon Department of Fish and Wildlife hatcheries supplied all 2002 broodstock eggs for the Umatilla River program.

Task 2.2: Disease Sampling

Disease Sampling of Summer Steelhead Broodstock

Spawned adult steelhead were sampled for the presence of replicating viral agents by ODFW Northeast Oregon Fish Pathology Laboratory (NOFPL) in La Grande for monitoring and evaluation purposes as part of the Umatilla Hatchery Fish Health Monitoring Program. Reproductive fluid, pyloric caeca, kidney, and spleen were sampled. Prespawn mortalities were also sampled for culturable bacteria.

Disease Sampling of Spring Chinook Salmon Broodstock

Adult spring chinook salmon were also sampled for the presence of selected pathogens. Ovarian fluid and pyloric caeca, kidney, and spleen samples from spawned females were assayed for replicating viral agents. Kidney samples from the same spawned females were examined for bacterial kidney disease (*Renibacterium salmoninarum*; BKD). Prespawn mortalities were sampled for culturable bacteria.

Disease Sampling of Fall Chinook Salmon Broodstock

Adult fall chinook salmon were also sampled. Ovarian fluid, pyloric caeca, kidney, and spleen samples from spawned females were assayed for replicating viral agents. Kidney samples from the same females were examined for BKD. Kidney samples were also taken from prespawn mortalities to test for BKD and other typical pathogens.

Disease Sampling of Coho Salmon Broodstock

Coho salmon broodstock were not collected in 2002. Oregon Department of Fish and Wildlife hatcheries supplied all 2002 broodstock eggs for the Umatilla River program.

Task 2.3: Adult Holding and Spawning Facility Maintenance

Maintenance, repair and service of electrical and mechanical equipment, ponds, pumps, water supply systems, screens, fencing, fishways, buildings and grounds was performed. Other maintenance was conducted as necessary.

Objective 3: Increased Spring Chinook Production

Task 3.1: Increased Spring Chinook Production

Funding was provided for the United States Fish and Wildlife Service (USFWS) to produce 350,000 spring chinook salmon juveniles at Little White Salmon Hatchery (LWSH) for release in the Umatilla River basin. The funding includes fin marking and code-wire tagging costs. This activity is an objective under this project and the funding is identified as an independent line item in the project budget. However, this is not a subcontract under the project and funding for this activity is contracted directly between BPA and the USFWS.

Objective 4: Increased Adult Spring Chinook Spawners

Task 4.1: Holding and Outplanting Spring Chinook Salmon

Fish Passage personnel utilized a 750 gallon fish transport truck to transfer adult spring chinook from Three Mile Dam to South Fork Walla Walla for temporary holding. On the day of collection, each fish was injected with Oxytetracycline 100 and Erythromycin 200 at a rate of approximately 10mg/kg/fish. The fish were given a second injection at the same dosage rate on July 2 at South Fork Walla Walla. Beginning June 7, fish were treated with formalin three days per week to help control fungus. A one-hour flow-through treatment at approximately 167 ppm was used. On August 8, all live fish were loaded into a 3,000 gallon transport truck and were hauled by Fish Passage personnel and released into natural production areas in the Walla Walla River basin. Sex, fork and MEHP lengths were taken on all mortalities and snouts were collected from all coded-wire tagged fish. Sex and marks were also recorded on all fish released.

In addition, Fish Passage personnel utilized 750 and 3,000 gallon fish transport trucks to transfer adult spring chinook from Ringold Hatchery to South Fork Walla Walla for temporary holding. Beginning June 10, fish were treated with formalin three days per week to help control fungus. A one-hour flow-through treatment at approximately 167 ppm was used. These fish were not injected with Oxytetracycline 100 and Erythromycin 200 at the time of collection; however, they were injected at South Fork Walla Walla on July 1 and again on August 6. The fish were injected at a rate of approximately 10mg/kg/fish. On August 8, all live fish were loaded into 750 and 3,000 gallon transport trucks and were hauled by Fish Passage personnel and released into natural production areas in the Walla Walla River basin. Sex and marks were recorded on all mortalities and fish released. Fork lengths were also collected from mortalities. None of these fish were coded-wire tagged.

Objective 5: Umatilla Satellite Facilities Planning

Task 5.1: Umatilla Satellite Facilities Review

Meetings with CTUIR, BPA, and ODFW were held to discuss proposal and designs for new Umatilla Hatchery satellite facilities scheduled for completion in the Walla Walla River Basin.

RESULTS AND DISCUSSION

Objective 1: Adult Survival and Homing

Task 1.1: Juvenile Holding

Acclimation and Release of Juvenile Salmonids

Fall chinook salmon have been released in the Umatilla River Basin every year since 1982 and from acclimation facilities from 1983 to 1991 and from 1995 through 2002 (Table 1). The 1982 release was from Spring Creek tule stock (Table 2). Since then, all releases have been of upriver bright stock. Spring chinook salmon from Carson stock have been released since 1986 (Table 3) and from acclimation facilities from 1986 to 1992 and from 1994 through 2002 (Table 1). Summer steelhead of Skamania and Oxbow stocks were released from 1967 through 1970 (Table 4). In 1975, one release of Umatilla stock steelhead occurred and fish releases every year since 1981 have been from this stock. Summer steelhead have been released from acclimation facilities since 1984 (Table 5). Coho salmon have been released since 1987 and from acclimation facilities in 1987, 1989 through 1991, and from 2000 to 2002 (Tables 5 and 6).

Three groups of summer steelhead (156,804 fish), six groups of spring chinook (876,121 fish), three groups of fall chinook (827,758 fish), and four groups of coho salmon (1,621,857 fish) were among the 3,482,540 salmon and steelhead acclimated and released into the Umatilla River basin in 2002 (Table 7). One group of 312,869 fall chinook subyearlings was released directly into the Umatilla River at RM 48.5.

Acclimation at Bonifer

Summer Steelhead

A group of 54,917 summer steelhead at 5.1/lb. was released from Bonifer. The fish were allowed to voluntarily release from April 2 to 9, 2002. The remaining fish were released on April 9, after being held for 27 to 35 days (Table 7). Included in the release were 21,274 coded-wire tagged fish (adipose and left ventral fin clipped; Appendix A) and 33,643 adipose clipped only fish. They were fed 0.35% BWD and total mortality was 0.24% (Table 8). The mean temperature and DO during acclimation was 7.1 degrees C and 9.0 mg/l, respectively (Table 8). The average fork length was 211 mm (Table 9). The length frequency distribution is shown in Figure 2.

Acclimation at Minthorn

Summer Steelhead

One group of 47,521 summer steelhead at 4.5/lb. was released from Minthorn. The fish were allowed to voluntarily release from April 24 to 30, 2002. The remaining fish were released on April 30 after being acclimated for 20 to 27 days (Table 7). Included in the release were 20,422 coded-wire tagged fish (adipose and left ventral fin clipped; Appendix A) and 27,099

adipose clipped only fish. The fish were fed 0.61% BWD and total mortality was 1.43% (Table 8). The mean temperature and DO was 8.8 degrees C and 8.0 mg/l, respectively (Table 8). The average fork length was 210 mm (Table 9). The length frequency distribution of this group is shown in Figure 3.

Table 1. Juvenile fall and spring chinook salmon releases in the Umatilla River Basin (1982-2002). /a

Year	Fall Chinook							Spring Chinook			
	Lower Umatilla	Upper Umatilla	Bonifer	Minthorn	Thomhollow	Imeques	Pendleton	Lower Umatilla	Upper Umatilla	Bonifer	Imeques
1982	3,807,171 (sy) (b)										
1983		80,564 (y)	20,000 (y)								
1984	966,250 (sy)	175,104 (y)	53,308 (y)								
1985	3,223,172 (sy)	60,507 (y)	137,655 (y) 51,000 (f)								
1986	2,029,602 (sy)		115,779 (y)	91,036 (y) 35,574 (f)					300,438 (sy)	99,970 (y) 75,000 (f)	
1987	1,476,830 (sy)		102,363 (y)	111,143 (y & sy)					169,100 (sy)	99,897 (y)	
1988	3,316,007 (sy)	79,681 (f)	99,550 (y)	115,199 (y & f)				156,312 (y)	210,496 (y & f)	107,427 (y & f)	
1989	2,393,710 (sy)	295,575 (y & f)		78,825 (f)					164,786 (y & f)	160,734 (y & f)	
1990		255,614 (y) 3,132,127 (sy & f)		71,864 (f)				99,775 (y)	195,425 (y & f)	194,783 (y & f)	
1991	10,462 (sy) (c)	194,847 (y) 3,166,079 (sy)		79,672 (sy)				5,937 (y) (c)	265,428 (y & f)	181,649 (y & f)	
1992	7,837 (sy) (c)	220,440 (y) 3,182,712 (sy)						5,272 (y) (c)	189,910 (y) 1,484,555 (sy & f)	109,101 (y)	
1993	29,681 (sy) (c)	2,629,917 (sy) 134,837 (y)						10,952 (y) (c)	480,864 (y) 1,128,176 (sy & f)		
1994	22,174 (sy) (c)	2,843,212 (sy) 283,453 (y)						8,890 (y) (c)	610,245 (y)		1,217,602 (sy & f)
1995					227,088 (y) 561,423 (sy)	1,904,875 (sy)					673,331 (y)
1996					204,022 (y) 853,598 (sy)	360,381 (y) 2,106,815 (sy)					378,561 (y)

Table 1 cont.

Year	Fall Chinook							Spring Chinook			
	Lower Umatilla	Upper Umatilla	Bonifer	Minthorn	Thornhollow	Imeques	Pendleton	Lower Umatilla	Upper Umatilla	Bonifer	Imeques
1997					433,347 (y)	86,574 (y)					225,883 (y)
1998					788,310 (sy)	1,792,523 (sy)					827,612 (y)
					436,010 (y)	1,767,302 (sy)					114,370 (f)
1999					1,010,140 (sy)	1,842,666 (y)					659,607 (y)
2000					449,568 (y)	1,842,666 (sy)	2,044,648 (sy)				816,184 (y)
2001	322,283 (sy)				469,756 (y)						782,733 (y)
					975,871 (sy)						
2002	312,869 (sy)				400,761 (y)						876,121 (y)
					324,713 (sy)						
					520,564 (y)						
					307,194 (sy)						

/a y = yearling releases; sy = subyearling releases; f = fall releases; upper Umatilla River includes Meacham Creek

/b Releases in 1982 were Tule stock; all other releases have been upriver brights

/c Passage evaluation releases

Table 2. Hatchery releases of fall chinook in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1982	Bonneville/SCNFH	3,807,171	79.0-92.0	Tule
1983	Bonneville	100,564	5.9	Bonneville URB
1984	Bonneville	228,412	8.6	Bonneville URB
1984	Bonneville	966,250	85.1	Bonneville URB
1985	Bonneville	3,223,172	92.3	Bonneville URB
1985	Bonneville	198,162	7.8	Bonneville URB
1985	Bonneville	51,000	16.2	Bonneville URB
1986	Irrigon	206,815	4.7-5.0	Bonneville URB
1986	Irrigon	2,029,602	86.0	Bonneville URB
1986	Irrigon	35,574	11.6	Bonneville URB
1987	Irrigon	1,476,830	60.4	Priest Rapids URB
1987	Bonneville	211,506	8.1-8.6	Bonneville URB
1987	Irrigon	2,000	20.0	Priest Rapids URB
1988	Irrigon	1,886,757	68.3	Priest Rapids URB
1988	Irrigon	1,429,250	93.1	Bonneville URB
1988	Irrigon	94,089	8.6-9.8	Priest Rapids URB
1988	Bonneville	200,341	8.8-10.2	Bonneville URB

Year of Release	Hatchery	No. Released	No./lb.	Stock
1989	Bonneville	217,443	8.6	Bonneville URB
1989	Irrigon	2,393,710	66.6	Priest Rapids URB
1989	Irrigon	156,957	10.9-11.1	Priest Rapids URB
1990	Bonneville	255,614	8.2	Bonneville URB
1990	Irrigon	2,425,681	87.5	Bonneville URB
1990	Irrigon	629,800	82.4	Priest Rapids URB
1990	Irrigon	148,510	8.8-9.2	Bonneville URB
1991	Bonneville	194,847	7.8	Bonneville URB
1991	Irrigon	10,462	80.0-194.0	Bonneville URB
1991	Irrigon	3,245,751	80.5-86.0	Bonneville URB
1992	Bonneville	220,440	7.6-7.7	Bonneville URB
1992	Umatilla	2,678,343	62.2	Bonneville URB
1992	Irrigon	504,369	53.4	Umatilla River
1992	Irrigon	5,167	62.8	Umatilla River
1992	Umatilla	2,670	112.0	Bonneville URB
1993	Bonneville	134,837	9.1	Bonneville URB
1993	Umatilla	2,629,917	62.7	Upriver Brights /a
1993	Umatilla	29,681	95.5-142.0	Upriver Brights /a
1994	Bonneville	283,453	8.5-10.4	Bonneville URB
1994	Umatilla	2,843,212	65.2	Upriver Brights /b
1994	Umatilla	22,174	85.0-171.0	Upriver Brights /b
1995	Bonneville	227,088	8.0	Bonneville URB
1995	Umatilla	2,466,298	63.1-64.7	Priest Rapids URB
1996	Bonneville	421,316	7.0-7.1	Bonneville URB
1996	Umatilla	143,087	5.1	Priest Rapids URB
1996	Umatilla	2,960,413	63.9-71.0	Priest Rapids URB
1997	Umatilla	258,953	7.6-8.1	Priest Rapids URB
1997	Willard	260,968	13.6	Upriver Brights /c
1997	Umatilla	2,580,833	66.0-67.3	Upriver Brights /b
1998	Bonneville	256,910	10.8	Bonneville URB
1998	Willard	179,100	7.8	Upriver Brights /c
1998	Umatilla	2,777,442	64.9-67.7	Priest Rapids URB
1999	Bonneville	449,568	9.0-9.4	Umatilla River
1999	Umatilla	1,842,666	55.9	Upriver Brights /d
2000	Bonneville	235,246	10.9	Umatilla River
2000	Bonneville	234,510	10.1	Umatilla River
2000	Umatilla	975,871	49.0	Priest Rapids URB
2000	Umatilla	2,044,648	48.3	Priest Rapids URB
2001	Bonneville	213,499	9.7	Umatilla River
2001	Bonneville	187,262	9.2	Umatilla River
2001	Umatilla	324,713	45.3	Umatilla River
2001	Umatilla	322,283	33.6	Umatilla River
2002	Bonneville	259,607	9.0	Umatilla River
2002	Bonneville	260,957	8.7	Umatilla River
2002	Umatilla	307,194	40.6	Umatilla River
2002	Umatilla	312,869	39.0	Umatilla River

/a Bonneville, Little White Salmon and Umatilla River broodstock

/b Priest Rapids and Umatilla River broodstock

/c Little White Salmon broodstock

/d Priest Rapids and Little White Salmon broodstock

Table 3. Hatchery releases of spring chinook in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1986	Carson	99,970	22.8	Carson
1986	Irrigon	300,438	87.0	Carson
1986	Irrigon	75,000	15.0	Carson
1987	Carson	99,897	10.4	Carson
1987	Oxbow	169,100	199.0	Carson
1988	Bonneville	1,196	21.4	Carson /a
1988	Carson	99,895	20.6	Carson
1988	Bonneville	297,377	8.3-10.3	Carson /a
1988	Bonneville	75,767	11.1	Carson /a
1989	Bonneville	325,520	10.6-12.0	Carson /a
1990	Carson	99,775	18.6	Carson
1990	Bonneville	390,208	9.0-13.4	Carson /a
1991	Carson	96,733	16.9-20.6	Carson
1991	Bonneville	196,657	10.1-11.8	Carson /a
1991	Bonneville	159,624	16.5-16.8	Carson /b
1992	Carson	90,982	18.7	Carson
1992	Carson	5,272	18.7	Carson
1992	Bonneville	208,029	8.5-9.2	Carson /a
1992	Umatilla	955,752	35.4	Carson
1992	Irrigon	294,458	32.5	Carson
1992	Bonneville	132,929	11.3	Carson
1992	Umatilla	101,416	19.4	Carson
1993	Bonneville	186,948	14.5	Carson
1993	Umatilla	208,782	8.3	Carson
1993	Carson	85,134	20.3	Carson
1993	Carson	10,952	20.0-20.5	Carson
1993	Umatilla	667,367	27.6	Carson
1993	Umatilla	460,809	19.9	Carson
1994	Umatilla	205,143	8.4	Carson
1994	Bonneville	152,854	11.5	Carson
1994	Bonneville	252,248	12.3	Carson
1994	Umatilla	8,890	8.1-8.3	Carson
1994	Umatilla	839,377	30.4	Carson
1994	Umatilla	378,225	8.7	Carson
1995	Bonneville	247,871	10.3	Carson
1995	Umatilla	275,804	7.9	Carson
1995	Bonneville	74,735	14.4	Carson
1995	Bonneville	74,921	11.4	Carson
1996	Umatilla	378,561	8.9	Carson /c
1997	Umatilla	225,883	9.1	Carson /d
1998	Umatilla	382,714	11.6	Carson /e
1998	Umatilla	114,370	18.1	Carson /f
1998	Little White Salmon	172,999	15.6	Carson /e
1998	Little White Salmon	172,258	11.6	Carson /e
1998	Carson	99,641	16.3	Carson
1999	Umatilla	253,831	13.7	Carson /f
1999	Little White Salmon	302,015	12.7-16.1	Carson /f
1999	Carson	103,761	13.2	Carson

Table 3 cont.

Year of Release	Hatchery	No. Released	No./lb.	Stock
2000	Umatilla	254,101	13.3	Carson /g
2000	Umatilla	103,621	12.2	Carson /g
2000	Little White Salmon	173,545	13.1	Carson /h
2000	Little White Salmon	185,069	11.1	Carson /h
2000	Carson	99,848	14.4	Carson
2001	Umatilla	91,727	14.8	Carson /f
2001	Umatilla	244,794	10.4	Carson /f
2001	Little White Salmon	165,310	13.0	Carson /f
2001	Little White Salmon	180,919	11.3	Carson /f
2001	CNFH	99,983	13.9	Carson
2002	Umatilla	107,717	13.8	Carson /f
2002	Umatilla	104,089	12.0	Carson /f
2002	Umatilla	148,048	13.7	Carson /f
2002	Umatilla	152,026	12.3	Carson /f
2002	Willard NFH	143,516	17.0	Carson /f
2002	Willard NFH	220,725	14.9	Carson /f

/a Carson via Lookingglass broodstock

/b Carson via Lookingglass, Umatilla River and Big Canyon broodstock

/c Carson via Lookingglass (Wallowa H.) and Ringold (Lyons Ferry H.) broodstock

/d Carson via Ringold (Lyons Ferry H.) and Little White Salmon broodstock

/e Carson via Little White Salmon broodstock

/f Carson via Umatilla River broodstock

/g Carson via Ringold (Lyons Ferry H.) and Umatilla River broodstock

/h Carson via Ringold (Little White Salmon H.) broodstock

Table 4. Hatchery releases of summer steelhead in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1967	Gnat Creek	109,805	75.0	Skamania
1967	Oak Springs	238,020	117.0	Idaho (Oxbow)
1967	Wallowa	142,240	240.0	Idaho (Oxbow)
1968	Gnat Creek	23,100	66.0	Skamania
1968	Gnat Creek	150,000	Eggs	Skamania
1969	Carson	174,341	145.0	Skamania
1970	Wizard Falls	39,489	8.0-9.0	Skamania
1975	Oak Springs	11,094	9.0	Umatilla River
1981	Oak Springs	17,558	6.0-9.0	Umatilla River
1981	Oak Springs	9,400	145.0	Umatilla River
1982	Oak Springs	59,494	7.0-8.0	Umatilla River
1982	Oak Springs	67,940	124.0	Umatilla River
1983	Oak Springs	60,500	11.0	Umatilla River
1983	Oak Springs	52,700	62.0	Umatilla River
1984	Oak Springs	57,939	6.5	Umatilla River
1984	Oak Springs	22,000	135.0	Umatilla River
1985	Oak Springs	53,850	7.0	Umatilla River

Table 4 cont.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1985	Oak Springs	39,134	150.0	Umatilla River
1986	Oak Springs	54,137	8.4	Umatilla River
1987	Oak Springs	1,485	5.5	Umatilla River
1988	Oak Springs	95,290	6.5-10.3	Umatilla River
1988	Oak Springs	10,033	57.5	Umatilla River
1988	Irrigon	24,618	3200.0	Umatilla River
1989	Oak Springs	81,712	5.5-6.6	Umatilla River
1990	Oak Springs	89,193	5.5-7.7	Umatilla River
1991	Oak Springs	71,935	6.2-8.7	Umatilla River
1991	Oak Springs	3,998	12.5	Umatilla River
1992	Umatilla	19,977	5.8	Umatilla River
1992	Umatilla	47,458	5.8	Umatilla River
1992	Umatilla	64,550	5.0	Umatilla River
1992	Umatilla	67,419	5.5	Umatilla River
1992	Umatilla	5,443	5.8	Umatilla River
1993	Umatilla	44,824	4.5	Umatilla River
1993	Umatilla	47,979	5.6	Umatilla River
1993	Umatilla	65,465	6.1	Umatilla River
1994	Umatilla	51,403	4.9	Umatilla River
1994	Umatilla	49,598	5.1	Umatilla River
1994	Umatilla	52,097	5.2	Umatilla River
1994	Umatilla	1,732	5.7	Umatilla River
1995	Umatilla	48,539	5.6	Umatilla River
1995	Umatilla	49,983	4.7	Umatilla River
1995	Umatilla	47,941	5.5	Umatilla River
1996	Umatilla	47,543	5.1	Umatilla River
1996	Umatilla	49,377	5.3	Umatilla River
1996	Umatilla	49,783	5.1	Umatilla River
1997	Umatilla	46,788	4.6	Umatilla River
1997	Umatilla	41,555	5.4	Umatilla River
1997	Umatilla	48,944	4.9	Umatilla River
1998	Umatilla	49,084	4.7	Umatilla River
1998	Umatilla	41,088	5.9	Umatilla River
1998	Umatilla	47,313	5.5	Umatilla River
1999	Umatilla	41,843	4.9	Umatilla River
1999	Umatilla	44,226	5.5	Umatilla River
1999	Umatilla	35,564	5.9	Umatilla River
1999	Umatilla	9,878	43.9	Umatilla River
2000	Umatilla	51,659	4.8	Umatilla River
2000	Umatilla	52,736	4.7	Umatilla River
2000	Umatilla	49,343	6.4	Umatilla River
2001	Umatilla	50,829	4.8	Umatilla River
2001	Umatilla	48,291	5.4	Umatilla River
2001	Umatilla	41,403	4.7	Umatilla River
2002	Umatilla	54,917	5.1	Umatilla River
2002	Umatilla	54,366	4.2	Umatilla River
2002	Umatilla	47,521	4.5	Umatilla River
2002	Umatilla	1,826	3.6-4.2	Umatilla River

Table 5. Juvenile summer steelhead and coho releases in the Umatilla River Basin (1981-2002). /a

Year	Summer Steelhead					Coho			
	Lower Umatilla	Upper Umatilla	Minthorn	Bonifer	Thornhollow & Pendleton	Lower Umatilla	Upper Umatilla	Minthorn	Pendleton
1981		17,558 (y)							
1982		9,400 (sy)							
1983		59,494 (y)							
1984		67,940 (sy)		57,939 (y)					
1985		60,500 (y)		22,000 (sy)					
1986		52,700 (sy)		53,850 (y)					
1987				39,134 (sy)					
1988				54,137 (y)					
1989		1,485 (y) (2)				786,660 (y) (6)		161,889 (y)	
1990	33,984 (y) (3)	40,790 (4 & 5)	30,549 (y)			996,433 (y) (3)			
1991		29,586 (y)	29,852 (y)	22,274 (y)			829,607 (y)	157,299 (y)	
1992		29,446 (y)		59,747 (y)		202,315 (y) (6)	654,209 (y)	132,404 (y)	
1993	3,998 (y) (7)	29,325 (y)		42,610 (y)			802,655 (y)	152,974 (y)	
1994		5,443 (y) (7)	131,969 (y)	47,458 (y)			961,386 (y)		
1995			47,979 (y)	110,289 (y)		437,884 (y) (8)	454,794 (y)		
1996	1,732 (y) (7)		49,598 (y)	103,500 (y)		418,222 (y) (8)	465,883 (y)		
1997			49,983 (y)	96,480 (y)		824,963 (y) (8)	689,303 (y)		
1998			47,543 (y)	49,377 (y)	49,783 (y)	977,378 (y) (8)	500,005 (y)		
1999			46,788 (y)	90,499 (y)		1,400,939 (y) (8)			
2000			49,084 (y)	88,401 (y)			1,606,786 (y)		
2001	9,878 (sy)		41,843 (y)	79,790 (y)			1,475,922 (y)		
2002			104,395 (y)	49,343 (y)					1,561,290 (y)
			92,232 (y)	48,291 (y)					1,474,559 (y)
			48,739 (y)	54,917 (y)	54,974 (y)				1,621,857 (y)

/1 y = yearling releases; sy = subyearling releases; upper Umatilla River includes Meacham Creek

/2 Small release due to IHNV & IPN problems in eggs

/3 Fish released below Westland Dam

/4 Includes both experimental control group and gradeouts from 88 brood year

/5 Does not include unfed fry

/6 Released at RM 23

/7 Passage evaluation releases

/8 Released at RM 42.5

Table 6. Hatchery releases of coho salmon in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1966	Little White Salmon	500,000	1312.0	Little White Salmon
1967	Little White Salmon	200,000	1087.0	Little White Salmon
1967	Cascade	500,000	Eggs	Tanner Creek
1968	Little White Salmon	750,000	Eggs	Little White Salmon
1969	Carson	200,040	23.0	Little White Salmon
1987	Cascade	948,549	13.5-14.0	Tanner Creek
1988	Cascade	996,433	16.6	Tanner Creek
1989	Cascade	753,637	15.3-17.7	Tanner Creek
1989	Cascade	233,269	17.2-18.2	Tanner Creek
1990	Cascade	796,842	14.7	Tanner Creek
1990	Cascade	192,086	11.2-13.5	Tanner Creek
1991	Cascade	152,974	15.4	Tanner Creek
1991	Cascade	228,293	16.5	Tanner Creek
1991	Cascade	221,385	16.6	Tanner Creek
1991	Cascade	143,054	16.4	Tanner Creek
1991	Cascade	209,923	17.1	Tanner Creek
1992	Cascade	489,165	15.7	Tanner Creek
1992	Cascade	472,221	15.5	Tanner Creek
1993	Cascade	437,884	17.5	Tanner Creek
1993	Cascade	454,794	17.6	Tanner Creek
1994	Cascade	465,883	17.1	Tanner Creek
1994	Cascade	418,222	18.1	Tanner Creek
1995	Cascade	502,105	14.7	Tanner Cr. & Umatilla R
1995	Cascade	497,449	14.5	Tanner Cr. & Umatilla R
1995	Sandy	191,854	13.9	Tanner Creek
1995	Lower Herman Cr.	322,858	20.3	Tanner Creek
1996	Lower Herman Cr.	465,769	17.9	Tanner Creek
1996	Cascade	500,005	18.0	Tanner Creek
1996	Cascade	511,609	18.6	Tanner Creek
1997	Klaskanine	81,445	18.1	Tanner Creek
1997	Gnat Creek	881,341	15.3	Tanner Cr. & Sandy R.
1997	Lower Herman Cr.	438,153	16.0	Umatilla River
1998	Cascade	1,078,436	16.8	Tanner Creek
1998	Lower Herman Cr.	528,350	16.3	Tanner Creek
1999	Cascade	1,010,608	17.9	Tanner Creek
1999	Lower Herman Cr.	465,314	15.8	Tanner Creek
2000	Cascade	249,792	16.8	Tanner Creek
2000	Cascade	798,210	15.2	Tanner Creek
2000	Lower Herman Cr.	513,288	16.8	Tanner Creek
2001	Cascade	745,497	13.7	Tanner Creek
2001	Cascade	250,323	17.5	Tanner Creek
2001	Lower Herman Cr.	478,739	17.5	Tanner Creek
2002	Cascade	249,684	14.7	Tanner Creek
2002	Cascade	185,018	14.0	Tanner Creek
2002	Cascade	644,680	14.2	Tanner Creek
2002	Lower Herman Cr.	542,475	15.6	Tanner Creek

Table 7. Juvenile Salmon and Steelhead Releases in the Umatilla River Basin in 2002.

Species	Brood Year	Stock	Hatchery	Number Released	No./lb.	Release Location	In Facility	In River	Mark	No. Marked
Fall Chinook	2000	Umatilla URB	Bonneville	259,607	9.0	Thornhollow	Feb. 12/14	Mar. 1/7	AdCWT BWT	26,355 233,252
Fall Chinook	2000	Umatilla URB	Bonneville	260,957	8.7	Thornhollow	Mar. 13/18	Apr.4/11	AdCWT BWT	27,838 233,119
Fall Chinook	2001	Priest Rapids URB	Umatilla	307,194	40.6	Thornhollow	May 6	May 17/23	AdCWT	302,655
Fall Chinook	2001	Priest Rapids URB	Umatilla	<u>312,869</u>	39.0	Uma. RM 48.5	-----	May 23	AdCWT	304,388
Subtotal				1,140,627						
Spring Chinook	2000	Umatilla	Umatilla	107,717	13.8	Imeques	Nov. 13/14	Mar. 1/8	AdLV CWT Ad Only	42,066 65,651
Spring Chinook	2000	Umatilla	Umatilla	104,089	12.0	Imeques	Jan. 14	Mar. 1/8	AdLV CWT Ad Only	41,844 62,245
Spring Chinook	2000	Umatilla	Umatilla	148,048	13.7	Imeques	Jan. 14/15	Feb. 2/7	AdLV CWT Ad Only	19,543 128,505
Spring Chinook	2000	Umatilla	Umatilla	152,026	12.3	Imeques	Jan. 15/16	Mar. 1/8	AdLV CWT Ad Only	62,256 89,770
Spring Chinook	2000	Umatilla	Willard NFH	143,516	17.0	Imeques	Feb. 12/13	Mar. 8/14	AdLV CWT Ad Only	15,993 127,523
Spring Chinook	2000	Umatilla	Willard NFH	<u>220,725</u>	14.9	Imeques	Mar. 12/14	Apr. 4/11	AdLV CWT Ad Only	23,849 196,876
Subtotal				876,121						
Coho	2000	Tanner Cr.	Cascade	249,684	14.7	Pendleton	Feb. 11/13	Mar. 2/7	AdCWT CWT only	26,437 26,433
Coho	2000	Tanner Cr.	Cascade	644,680	14.2	Pendleton	Mar. 11/18	Apr 5/17	AdCWT	26,244
Coho	2000	Tanner Cr.	Cascade	185,018	14.0	Pendleton	Mar. 12	Mar. 29	None	
Coho	2000	Tanner Cr.	Lower Herman Cr.	<u>542,475</u>	15.6	Pendleton	Feb. 11/14	Mar. 2/7	AdCWT	26,629
Subtotal				1,621,857						
Summer Sthd.	2001	Umatilla R.	Umatilla	54,917	5.1	Bonifer	Mar. 5/6	Apr. 2/9	AdLV CWT Ad Only	21,274 33,643
Summer Sthd.	2001	Umatilla R.	Umatilla	47,521	4.5	Minthorn	Apr 3/4	Apr. 24/Apr. 30	AdLV CWT Ad Only	20,422 27,099
Summer Sthd.	2001	Umatilla R.	Umatilla	<u>54,366</u>	4.2	Pendleton	Apr. 2/3	Apr. 24/Apr. 30	AdLV CWT Ad Only	21,241 33,125
Subtotal				156,804						
TOTAL				3,795,409						

Table 8. Food rations, mortalities, temperatures, and D.O. concentrations during acclimation of juvenile summer steelhead, coho, and spring and fall chinook salmon at Bonifer, Minthorn, Thornhollow, Imeques, and Pendleton acclimation facilities in 2002.

Species	Release Location	Release Date	Days Held	Food Fed (%)	Mortality		Temperature (C)			D.O. (mg/L)		
					Total	%	Min.	Max.	Average	Min.	Max.	Average
Summer Steelhead	Bonifer	Apr 2/9	27-35	0.35	131	0.24	4.3	10.5	7.1	6.7	10.9	9.0
Summer Steelhead	Minthorn	Apr 24/Apr 30	20-27	0.61	690	1.43	6.4	13.5	8.8	6.5	11.1	8.0
Summer Steelhead	Pendleton	Apr 24/Apr 30	21-28	0.42	34	0.06	4.6	12.9	8.0	7.7	11.8	10.1
Fall Chinook	Thornhollow	Mar 1/7	15-23	0.23	260	0.10	1.6	7.0	4.1	9.4	13.2	11.4
Fall Chinook	Thornhollow	Apr 4/11	17-29	0.42	577	0.22	2.5	9.9	5.5	8.3	12.4	10.7
Fall Chinook	Thornhollow	May 17/23	11-17	1.59	571	0.19	5.0	13.4	8.9	9.4	13.0	11.2
Spring Chinook	Imeques	Feb 2/7	18-24	0.18	348	0.23	0.2	4.9	2.9	10.4	13.3	11.9
Spring Chinook	Imeques	Mar 1/8	108-116	0.38	233	0.22	0.2	9.9	4.4	8.9	13.9	11.7
Spring Chinook	Imeques	Mar 1/8	46-53	0.31	615	0.59	0.2	6.4	3.3	10.2	13.2	12.0
Spring Chinook	Imeques	Mar 1/8	44-52	0.24	837	0.55	0.2	6.4	3.3	10.0	13.3	11.8
Spring Chinook	Imeques	Mar 8/14	23-30	0.69	218	0.15	1.3	6.4	3.8	10.5	13.1	11.8
Spring Chinook	Imeques	Apr 4/11	21-30	1.18	599	0.27	2.3	9.2	5.1	9.3	12.5	11.3
Coho	Pendleton	Mar 2/7	17-24	0.32	322	0.13	1.3	8.1	4.6	9.4	14.0	11.3
Coho	Pendleton	Mar 29	17	0.55	314	0.17	3.1	8.1	5.3	8.5	12.4	10.9
Coho	Pendleton	Apr 5/17	18-37	0.48	734	0.11	3.1	10.1	6.4	8.0	12.5	10.4
Coho	Pendleton	Mar 2/7	16-24	0.32	742	0.14	1.3	8.1	4.6	9.4	13.9	11.3

Table 9. Size at release for juvenile summer steelhead, coho, and spring and fall chinook salmon released in the Umatilla River Basin in 2002.

Species	Release Location	Release Date	Days Held	No./lb.			Fork Length (mm)		
				Mean	Std. Dev.	N =	Mean	Std. Dev.	N =
Summer Steelhead	Bonifer	Apr 2/9	27-35	5.1	1.4	99	211	18	316
Summer Steelhead	Minthorn	Apr 24/Apr 30	20-27	4.5	1.4	197	210	22	333
Summer Steelhead	Pendleton	Apr 24/Apr 30	21-28	4.2	1.2	105	222	23	311
Fall Chinook	Thornhollow	Mar 1/7	15-23	9.0	2.4	221	160	14	652
Fall Chinook	Thornhollow	Apr 4/11	17-29	8.7	2.3	207	164	16	621
Fall Chinook	Thornhollow	May 17/23	11-17	40.6	9.4	213	99	7.9	707
Spring Chinook	Imeques	Feb 2/7	18-24	13.7	3.8	111	139	11	337
Spring Chinook	Imeques	Mar 1/8	108-116	13.8	2.7	102	136	9	376
Spring Chinook	Imeques	Mar 1/8	46-53	12.0	3.1	102	143	11	401
Spring Chinook	Imeques	Mar 1/8	44-52	12.3	2.9	102	145	13	335
Spring Chinook	Imeques	Mar 8/14	23-30	17.0	3.1	113	126	8	435
Spring Chinook	Imeques	Apr 4/11	21-30	14.9	2.9	227	132	8	714
Coho	Pendleton	Mar 2/7	17-24	14.7	3.4	300	136	10	300
Coho	Pendleton	Mar 29	17	14.0	3.5	302	140	10	302
Coho	Pendleton	Apr 5/17	18-37	14.2	3.6	445	141	11	442
Coho	Pendleton	Mar 2/7	16-24	15.6	4.2	410	135	12	410

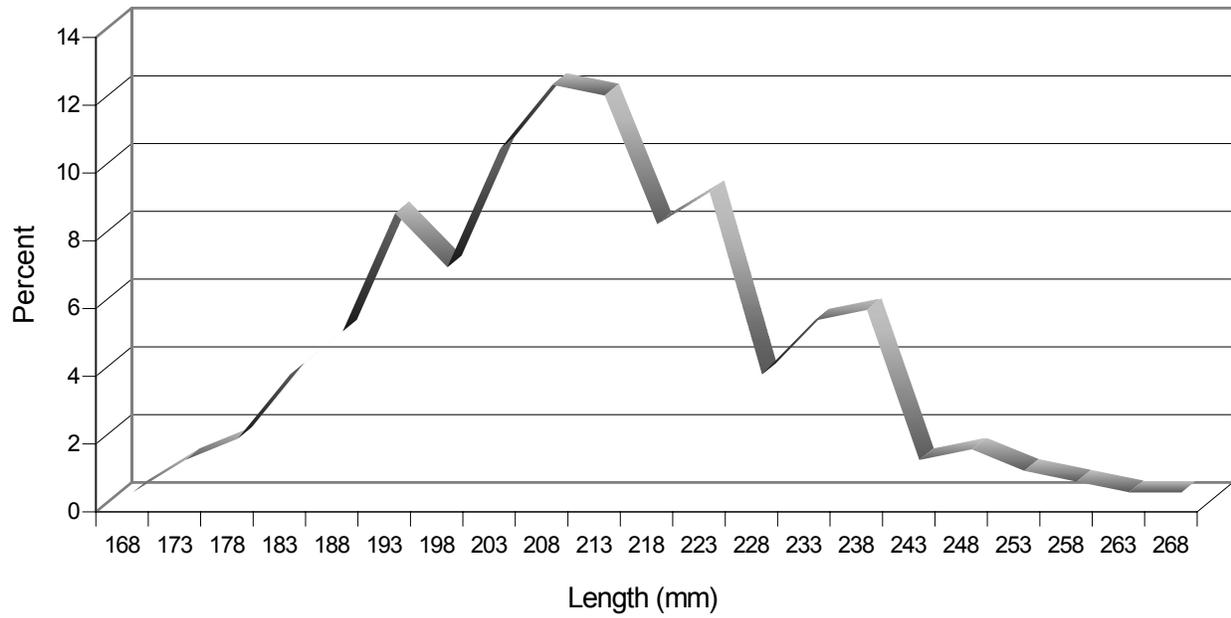


Figure 2. Length frequency distribution of juvenile summer steelhead released at Bonifer Acclimation Facility between 4/2 and 4/9/02.

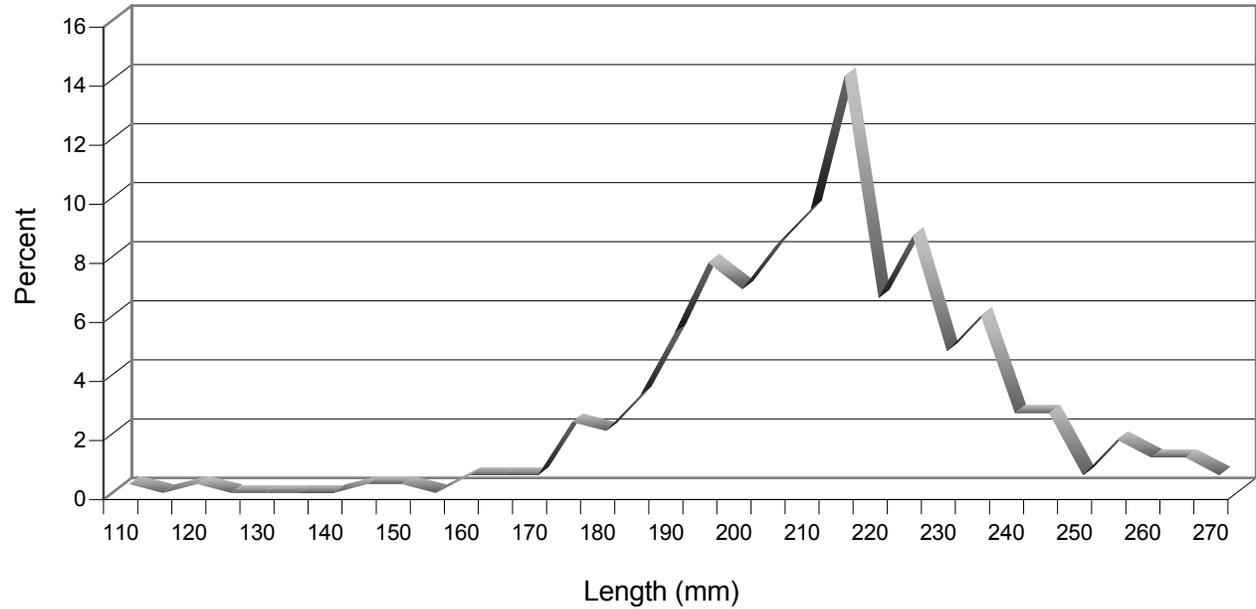


Figure 3. Length frequency distribution of juvenile summer steelhead released at Minthorn Acclimation Facility between 4/24 and 4/30/02.

Acclimation at Thornhollow

Fall Chinook

One group of 259,607 fall chinook yearlings at 9.0/lb. was released from Thornhollow between March 1 and 7, 2002 after being acclimated for 15 to 23 days (Table 7). This included 26,355 coded-wire tagged fish (adipose clipped; Appendix A) and 233,252 blank wire tagged fish. They were fed 0.23% BWD and total mortality was 0.10% (Table 8). The mean temperature and DO during acclimation was 4.1 degrees C and 11.4 mg/l, respectively (Table 8). The average fork length was 160 mm (Table 9). The length frequency distribution is shown in Figure 4.

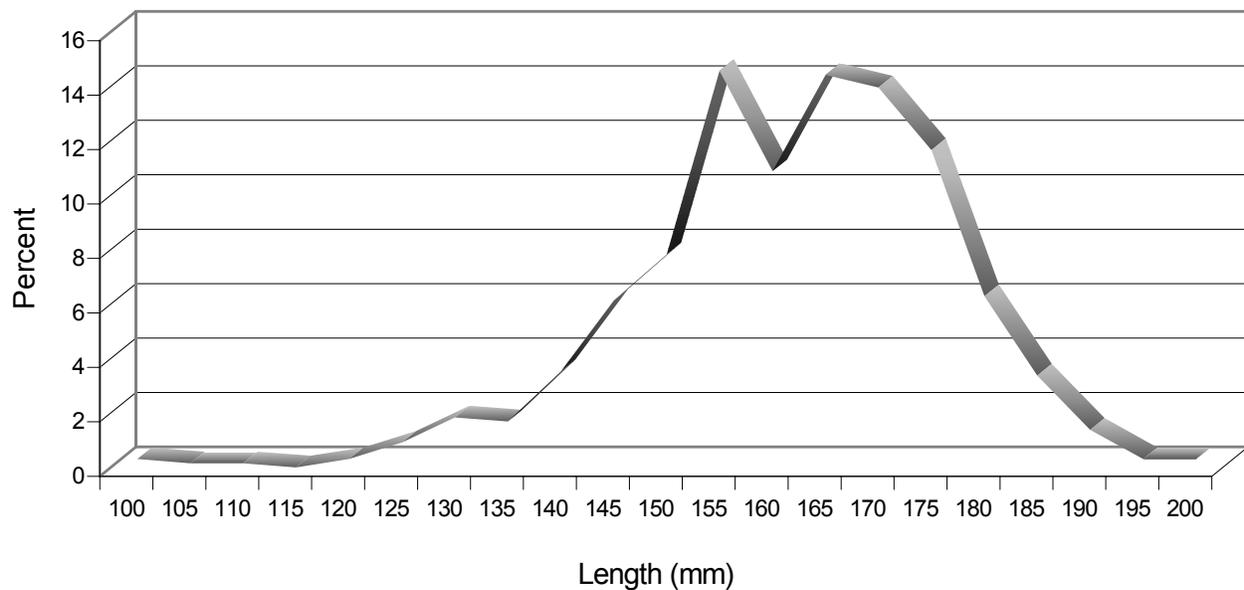


Figure 4. Length frequency distribution of juvenile fall chinook salmon released at Thornhollow Acclimation Facility between 3/1 and 3/7/02.

A second group of 260,957 fall chinook yearlings at 8.7/lb. was released from Thornhollow between April 4 and 11, 2002, after being held for 17 to 29 days (Table 7). Included in the release were 27,838 coded-wire tagged fish (adipose clipped; Appendix A) and 233,119 blank wire tagged fish. They were fed 0.42% BWD and total mortality was 0.22% (Table 8). The mean temperature and DO was 5.5 degrees C and 10.7 mg/L, respectively (Table 8). The average fork length was 164 mm (Table 9). The length frequency distribution of this group is shown in Figure 5.

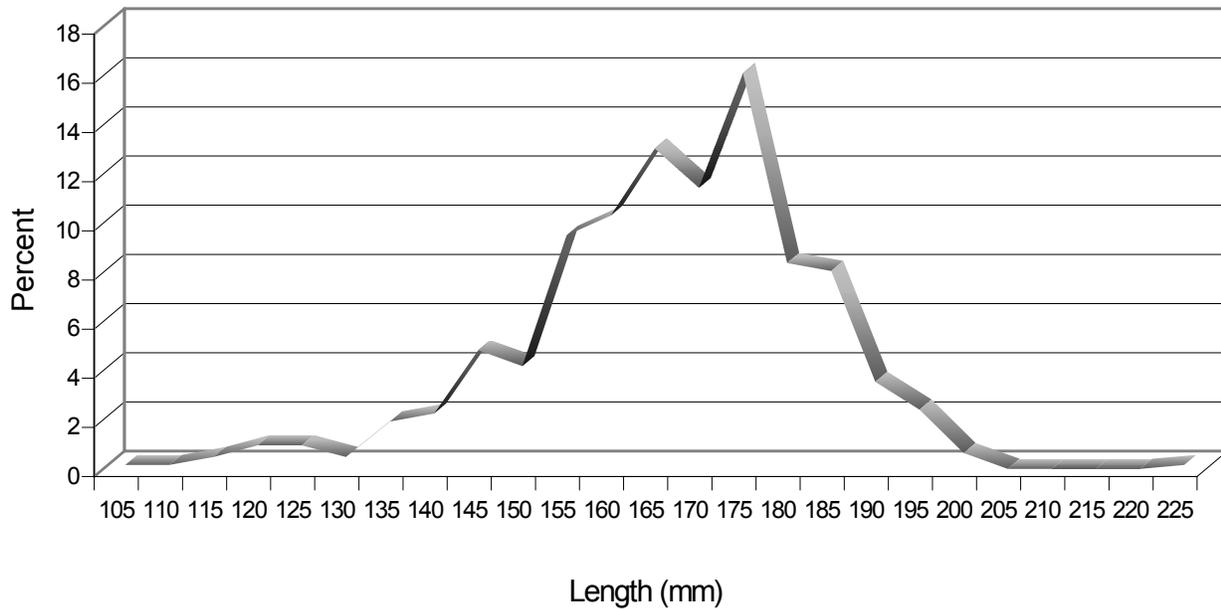


Figure 5. Length frequency distribution of juvenile fall chinook salmon released at Thornhollow Acclimation Facility between 4/4 and 4/11/02.

One group of 307,194 fall chinook subyearlings at 40.6/lb. was acclimated at Thornhollow and released between May 17 and 23, 2002, after being held for 11 to 17 days (Table 7). This included 302,655 coded-wire tagged fish (adipose clipped; Appendix A). They were fed 1.59% BWD and total mortality was 0.19% (Table 8). The mean temperature and DO during acclimation was 8.9 degrees C and 11.2 mg\L, respectively (Table 8). The average fork length was 99 mm (Table 9). The length frequency distribution of this group is shown in Figure 6.

Acclimation at Imeques C-mem-ini-kem

Spring Chinook

One group of 148,048 spring chinook yearlings at 13.7/lb. was acclimated at Imeques and released between February 2 and 7, 2002, after being acclimated for 18 to 24 days (Table 7) This included 19,543 coded-wire tagged fish (adipose and left ventral clipped; Appendix A) and 128,505 adipose clipped fish. They were fed 0.18% BWD and total mortality was 0.23% (Table 8). The mean temperature and DO during acclimation was 2.9 degrees C and 11.9 mg\L, respectively (Table 8). The average fork length was 139 mm (Table 9). The length frequency distribution of this group is shown in Figure 7.

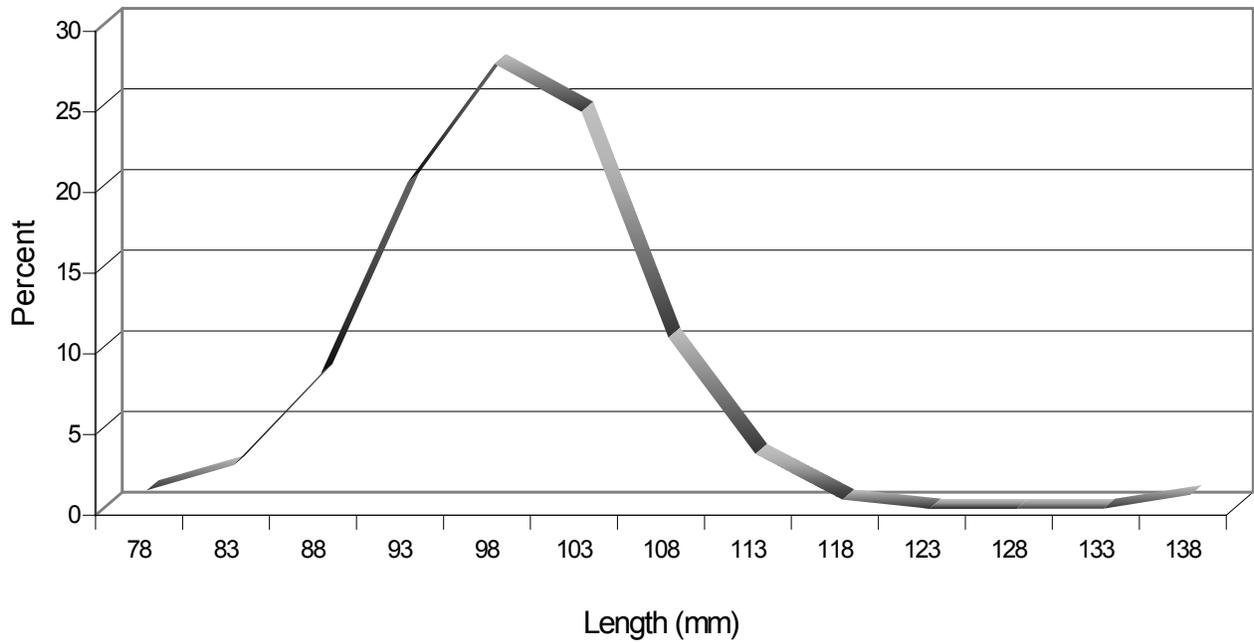


Figure 6. Length frequency distribution of juvenile fall chinook salmon released at Thornhollow Acclimation Facility between 5/17 and 5/23/02.

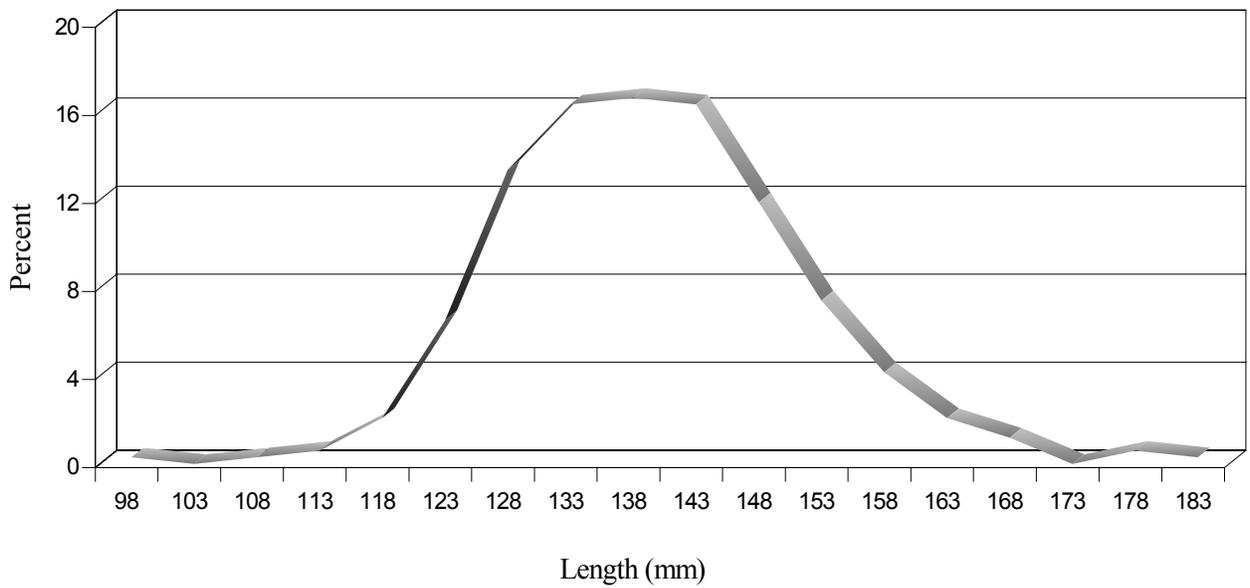


Figure 7. Length frequency distribution of juvenile spring chinook salmon released at Imeques C-mem-ini-kem Acclimation Facility between 2/2 and 2/7/02.

One group of 107,717 spring chinook yearlings at 13.8/lb. was released from Imeqes between March 1 and 8, 2002, after being acclimated for 108 to 116 days (Table 7). This included 42,066 coded-wire tagged fish (adipose and left ventral clipped; Appendix A) and 65,651 adipose clipped fish. They were fed 0.38% BWD and total mortality was 0.22% (Table 8). The mean temperature and DO was 4.4 degrees C and 11.7 mg/l, respectively (Table 8). The average fork length was 136 mm (Table 9). The length frequency distribution of this group is shown in Figure 8.

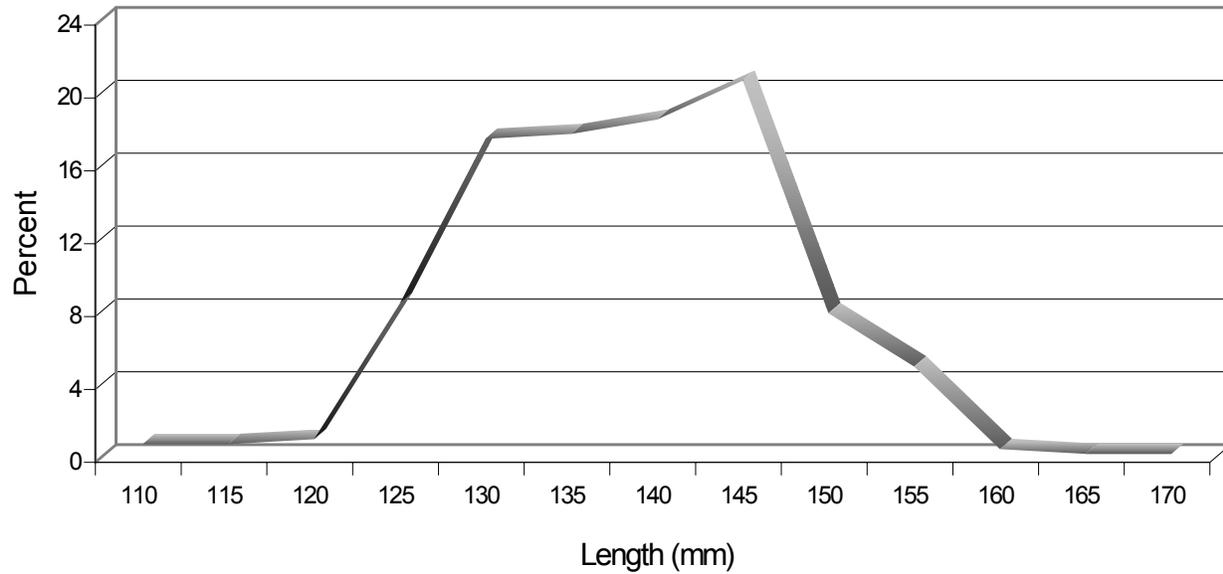


Figure 8. Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem Acclimation Facility between 3/1 and 3/8/02.

A second group of 104,089 spring chinook yearlings at 12.0/lb. was also released from Imeqes between March 1 and 8, 2002, after being acclimated for 46 to 53 days (Table 7). This included 41,844 coded-wire tagged fish (adipose and left ventral clipped; Appendix A) and 62,245 adipose clipped fish. They were fed 0.31% BWD and total mortality was .059% (Table 8). The mean temperature and DO was 3.3 degrees C and 12.0 mg/l, respectively (Table 8). The average fork length was 143 mm (Table 9). The length frequency distribution of this group is shown in Figure 9.

A third group of 152,026 spring chinook yearlings at 12.3/lb. was released from Imeqes between March 1 and 8, 2002, after being acclimated for 44 to 52 days (Table 7). This included 62,256 coded-wire tagged fish (adipose and left ventral clipped; Appendix A) and 89,770 adipose clipped fish. They were fed 0.24% BWD and total mortality was 0.55% (Table 8). The mean temperature and DO was 3.3 degrees C and 11.8 mg/l, respectively (Table 8). The average fork length was 145 mm (Table 9). The length frequency distribution of this group is shown in Figure 10.

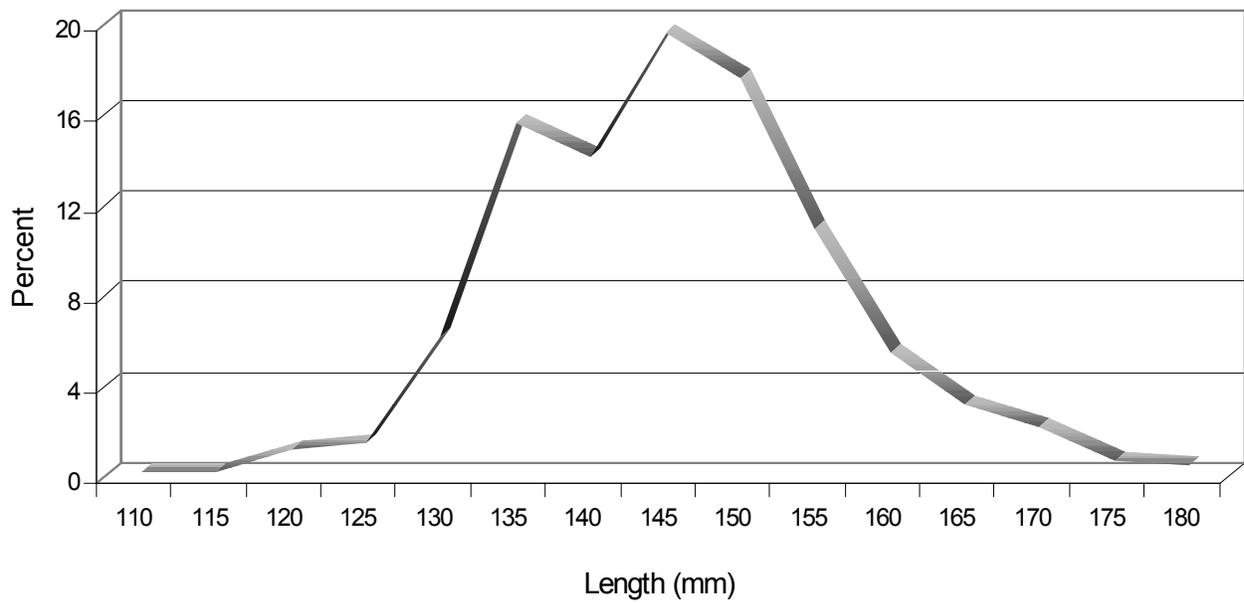


Figure 9. Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem Acclimation Facility between 3/1 and 3/8/02.

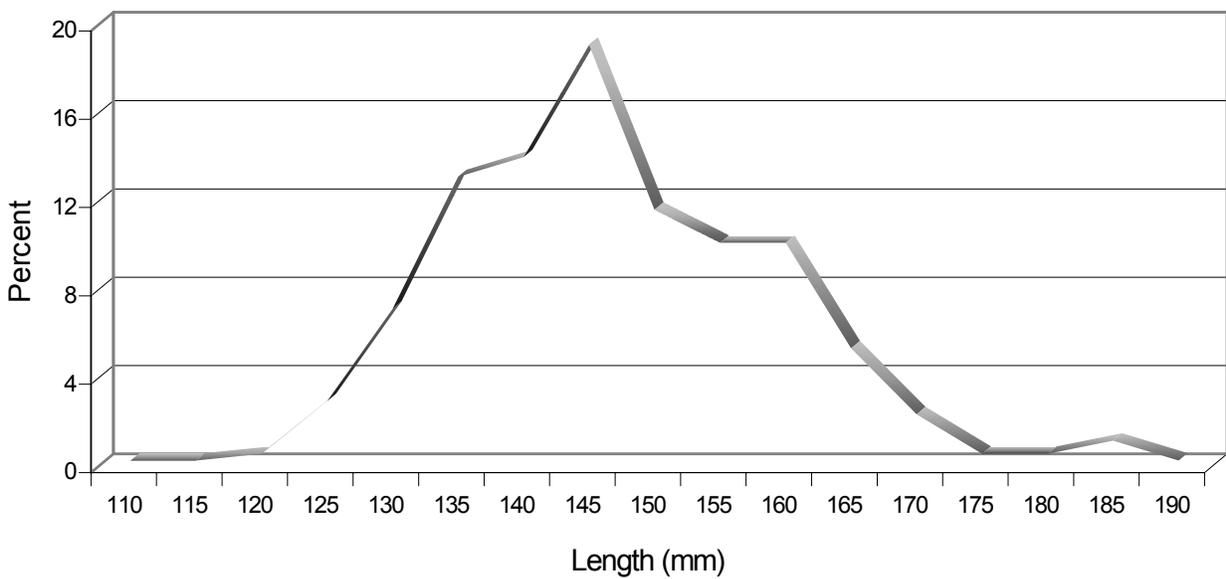


Figure 10. Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem between 3/1 and 3/8/02.

A group of 143,516 spring chinook yearlings at 17.0/lb. was also released from Imeqes between March 8 and 14, 2002, after being acclimated for 23 to 30 days (Table 7). This included 15,993 coded-wire tagged fish (adipose and left ventral clipped; Appendix A) and 127,523 adipose clipped fish. They were fed .069% BWD and total mortality was 0.15% (Table 8). The mean temperature and DO was 3.8 degrees C and 11.8 mg/l, respectively (Table 8). The average fork length was 126 mm (Table 9). The length frequency distribution of this group is shown in Figure 11.

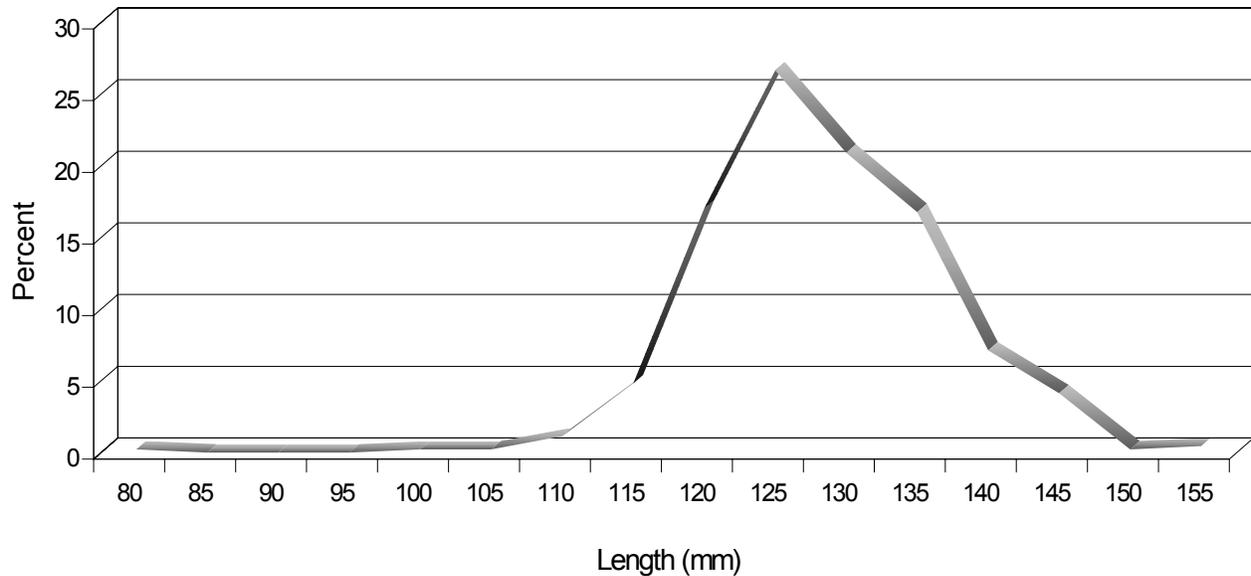


Figure 11. Length frequency distribution of juvenile spring chinook salmon released at Imeqes C-mem-ini-kem between 3/8 and 3/14/02.

A group of 220,725 spring chinook yearlings at 14.9/lb. was released from Imeqes between April 4 and 11, 2002, after being acclimated for 21 to 30 days (Table 7). This included 23,849 coded-wire tagged fish (adipose and left ventral clipped; Appendix A) and 196,786 adipose clipped fish. They were fed 1.18% BWD and total mortality was 0.27% (Table 8). The mean temperature and DO was 5.1 degrees C and 11.3 mg/l, respectively (Table 8). The average fork length was 132 mm (Table 9). The length frequency distribution of this group is shown in Figure 12.

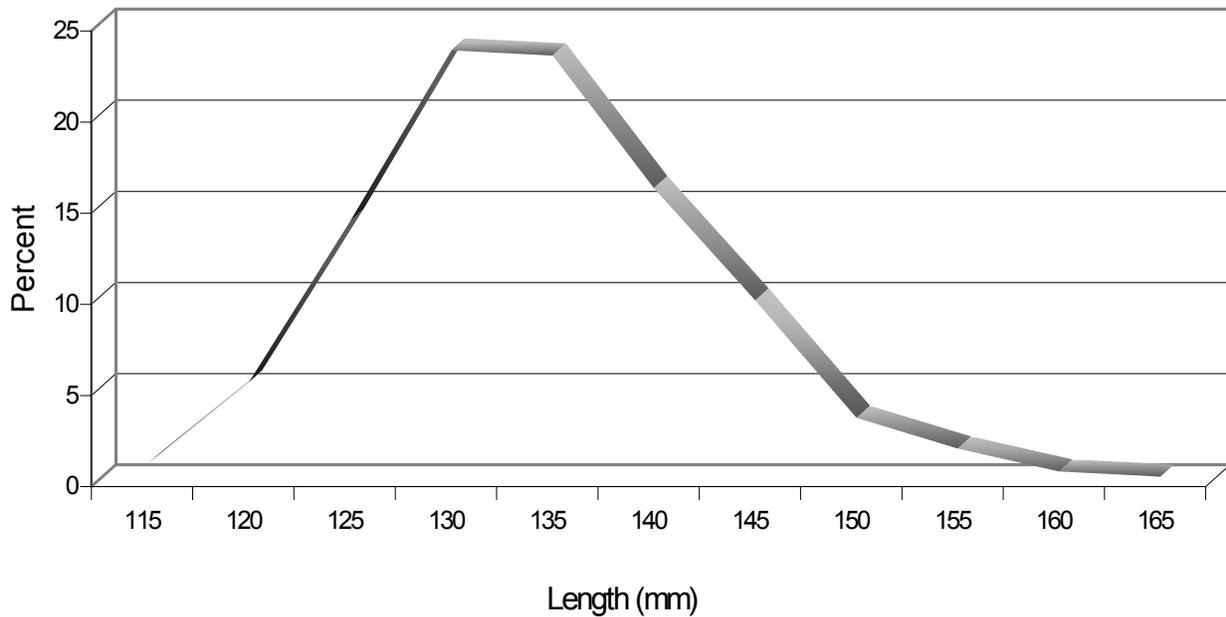


Figure 12. Length frequency distribution of juvenile spring chinook salmon released at Imeques C-mem-ini-kem between 4/4 and 4/11/02.

Acclimation at Pendleton

Summer Steelhead

A group of 54,366 summer steelhead at 4.2/lb. was released from Pendleton. The fish were allowed to voluntarily release from April 24 to 30, 2002. The remaining fish were released on April 30 after being acclimated for 21 to 28 days (Table 7). Included in the release were 21,241 coded-wire tagged fish (adipose and left ventral fin clipped; Appendix A) and 33,125 adipose clipped only fish. They were fed 0.42% BWD and total mortality was 0.06% (Table 8). The mean temperature and DO during acclimation was 8.0 degrees C and 10.1 mg/l, respectively (Table 8). The average fork length was 222 mm (Table 9). The length frequency distribution is shown in Figure 13.

Coho

One group of 249,684 coho yearlings at 14.7/lb. was released from Pendleton between March 2 and 7, 2002 after being acclimated for 17 to 24 days (Table 7). This included 26,437 adipose clipped coded-wire tagged fish, 26,433 non-clipped coded-wire tagged fish, and 196,814 unmarked fish (Appendix A). They were fed 0.32% BWD and total mortality was 0.13% (Table 8). The mean temperature and DO was 4.6 degrees C and 11.3 mg/l, respectively (Table 8). The average fork length was 136 mm (Table 9). The length frequency distribution of this group is shown in Figure 14.

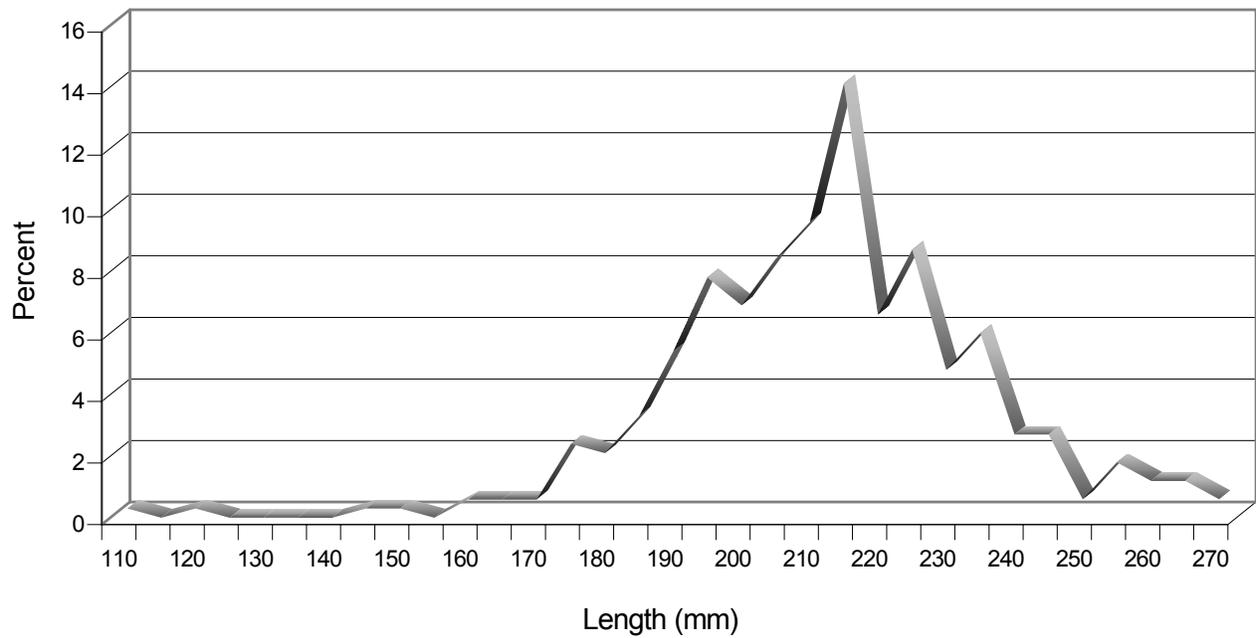


Figure 13. Length frequency distribution of juvenile summer steelhead released at Pendleton Acclimation Facility between 4/24 and 4/30/02.

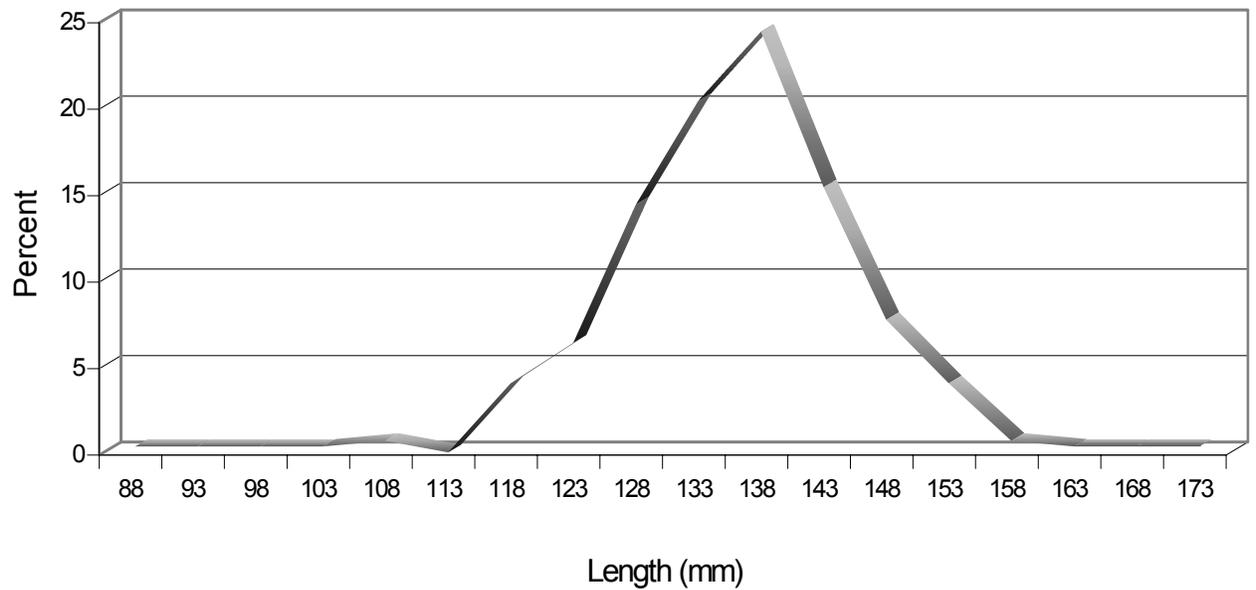


Figure 14. Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility between 3/2 and 3/7/02.

A second group of 542,475 coho yearlings at 15.6/lb. was also released from Pendleton between March 2 and 7, 2002, after being acclimated for 16 to 24 days (Table 7). This included 26,629 coded-wire tagged fish (adipose clipped; Appendix A) and 515,846 unmarked fish. They were fed 0.32% BWD and total mortality was 0.14% (Table 8). The mean temperature and DO was 4.6 degrees C and 11.3 mg/l, respectively (Table 8). The average fork length was 135 mm (Table 9). The length frequency distribution of this group is shown in Figure 15.

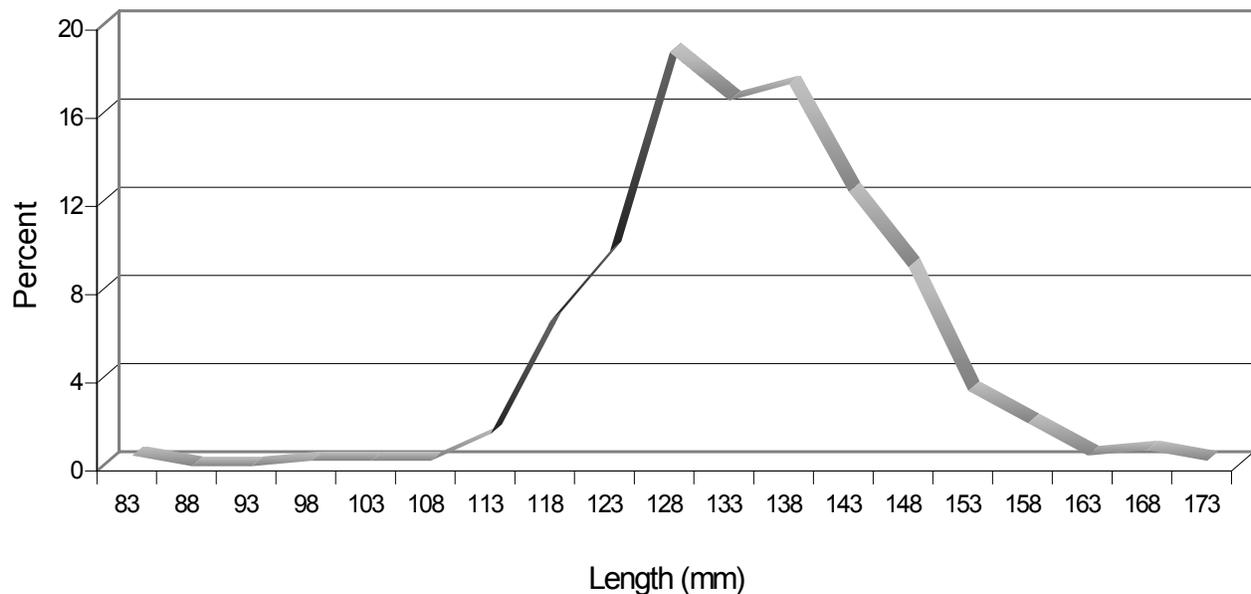


Figure 15. Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility between 3/2 and 3/7/02.

A third group of 185,018 coho yearlings at 14.0/lb. was released from Pendleton on March 29, 2002, after being acclimated for 17 days (Table 7). None of these fish were marked or coded-wire tagged (Appendix A). They were fed 0.55% BWD and total mortality was 0.17% (Table 8). The mean temperature and DO was 5.3 degrees C and 10.9 mg/l, respectively (Table 8). The average fork length was 140 mm (Table 9). The length frequency distribution of this group is shown in Figure 16.

A fourth group of 644,680 coho yearlings at 14.2/lb. was released from Pendleton between April 5 and 17, 2002, after being acclimated for 18 to 37 days (Table 7). This included 26,244 coded-wire tagged fish (adipose clipped; Appendix A) and 618,436 unmarked fish. They were fed 0.048% BWD and total mortality was 0.11% (Table 8). The mean temperature and DO was 6.4 degrees C and 10.4 mg/l, respectively (Table 8). The average fork length was 141 mm (Table 9). The length frequency distribution of this group is shown in Figure 17.

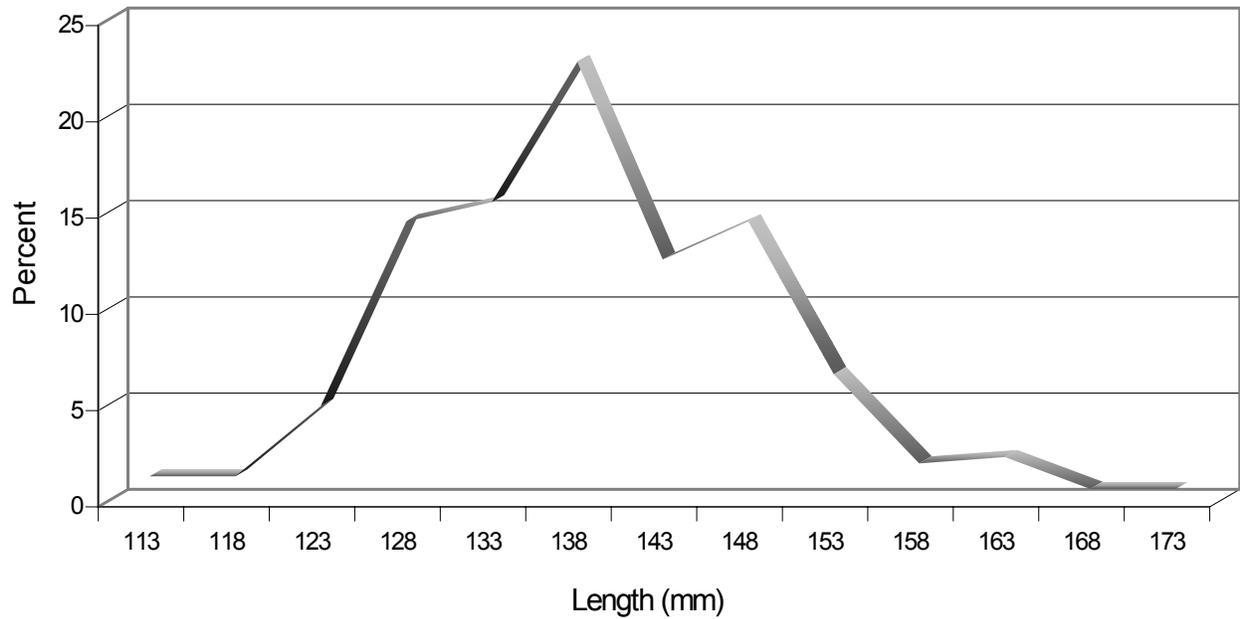


Figure 16. Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility 3/29/02.

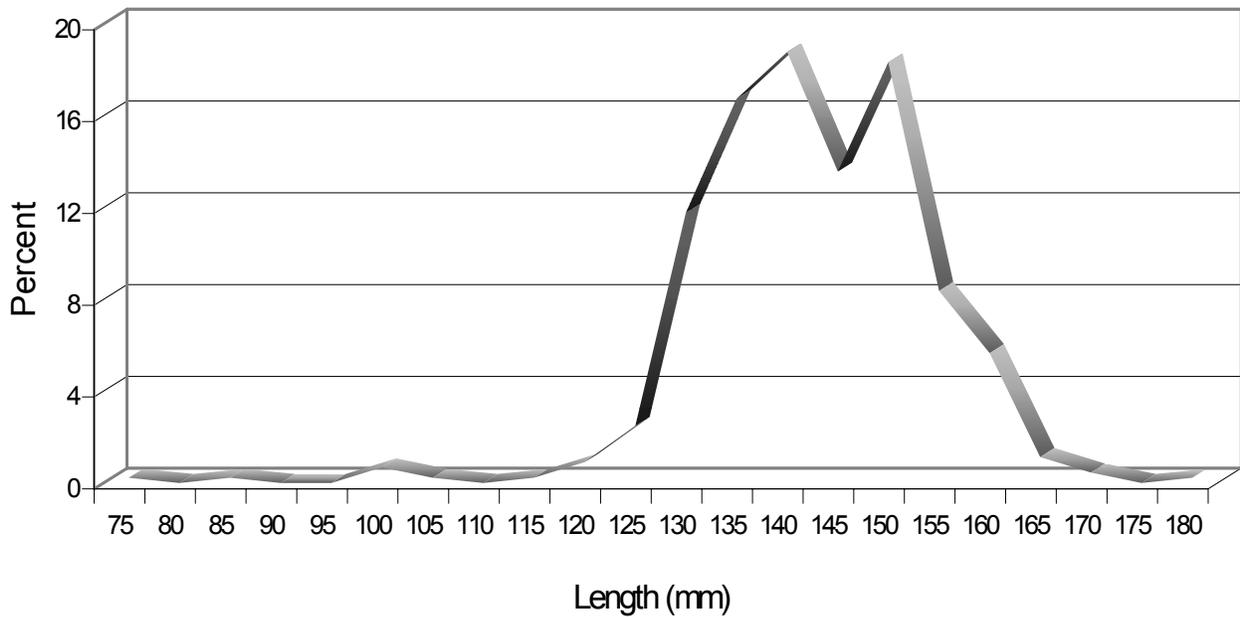


Figure 17. Length frequency distribution of juvenile coho salmon released at Pendleton Acclimation Facility between 4/5 and 4/17/02.

Task 1.2: Juvenile Outmigration Monitoring

In 2002, flows allowed the Westland Canal juvenile facility to operate in the bypass mode until July 7. Trapping began on this day and continued until the close of the trap on July 12 (Table 10). An estimated 200 pounds of fish, including warm-water and non-game species, were hauled; indicating the majority of the hatchery released fish migrated downstream prior to the trap being opened.

A total of 603 fish were sampled from July 8 to July 12 (Appendix B). An estimated 50.9% (307 fish) were unmarked chinook and 7.3% (44 fish) were adipose clipped fish from **yearling and subyearling chinook** releases. Sixty yearling coho (10.0%), 105 unmarked subyearling coho (17.4%), 31 subyearling steelhead (5.1%), one marked yearling steelhead (0.2%), and 55 warm-water and non-game species (9.1%) were also sampled.

Table 10. Estimated number of fish captured at the Westland Canal juvenile facility in 2002. /a

Date	Total Fish Hauled	Salmonids						Non-game & Warm Water Species
		Marked		Unmarked				
		Chinook /b	STS (y)	Coho (sy)	Coho (y)	Chinook (sy & y)	StS (sy)	
July 8	1,231	135	0	76	135	659	108	119
July 10	2,036	153	0	48	287	1,415	29	105
July 12	836	15	5	444	26	191	41	114
Total	4,103	303	5	567	448	2,264	178	337

/a The unmarked chinook sampled were believed to be both fall chinook subyearlings and spring chinook yearlings from natural production. y = yearling; sy = subyearling.

/b All were adipose clipped or CWT.

Task 1.3: Juvenile Acclimation Facility Maintenance

Regularly scheduled maintenance and repair was performed at all juvenile acclimation facilities in 2002. Routine facility maintenance work consisted mostly of weed abatement and maintenance of the electric fence at Bonifer. Project and Umatilla Passage Facility Operation and

Maintenance personnel performed critical maintenance and repair. Tasks included: 1) rock and gravel removal at the entrance to the Imeques intake screens, 2) replacing the computer board on the standby generator transfer switch at the Pendleton acclimation facility; 2) recalibrating the time delays in the standby generator at Thornhollow; 3) troubleshooting the food storage freezer; and 4) replacing the low water level alarm at Imeques.

Objective 2: Summer Steelhead, Fall Chinook and Coho Salmon Spawning

Task 2.1: Adult Collection, Holding and Spawning

Collection, Holding and Spawning of Summer Steelhead

A total of 100 unmarked and 10 marked summer steelhead were collected for broodstock from September 21, 2001, through April 2, 2002. Fish were selected throughout the run to provide a representative cross-section of the population. Broodstock collected by month are listed in Appendix C.

A total of 36 unmarked females, 32 unmarked males, and four marked males were spawned from April 3 to June 5, 2002 (Table 11 and Appendix D). An estimated 180,955 green eggs were taken with a mean fecundity of 5,027.

Total prespawn mortality during the adult holding period was 29.1% (Table 11). In comparison, prespawn mortality at Minthorn has ranged from 8.6 to 34.4 % for previous brood years.

Table 11. Summer steelhead broodstock collection, spawning, and mortality in 2001-02. /a

Number Collected			Number Spawned						Number of Mortality					
Females	Males	Total	Females	%	Males	%	Total	%	Females	%	Males	%	Total	%
50	60	110	36	72.0	36	60.0	72	65.5	10	20.0	22	36.7	32	29.1

/a Three unmarked females and three unmarked males were released back into the Umatilla River after the completion of spawning. One female killed for spawning was green. One male was live spawned.

Collection, Holding and Spawning of Spring Chinook Salmon

Umatilla River stock

A total of 322 female and 264 male spring chinook salmon were collected for broodstock at Three Mile Dam from April 22 to June 12, 2002 (Table 12). Two hundred sixty-six females and 241 males were spawned from August 21 to September 11, 2002, and an estimated 1,017,113 green eggs were taken (Appendix E). The mean fecundity was 3,824.

Total prespawn mortality was 3.1%. This included five males (1.9%) and 13 females (4.0%). In comparison, prespawn mortality has ranged from 2.4 to 23.3% in previous years. Twelve excess males and 34 excess females were released into the South Fork Walla Walla River at the end of the spawning season.

Table 12. Spring chinook broodstock collection, spawning, and mortality in 2002. /a

Number Collected			Number Spawned						Number of Mortality					
Females	Males	Total	Females	%	Males	%	Total	%	Females	%	Males	%	Total	%
322	264	586	266	82.6	241	91.3	507	86.5	13	4.0	5	1.9	18	3.1

/a The numbers in the table do not include one green male and one spawned out female.

Collection, Holding and Spawning of Fall Chinook Salmon

A total of 262 female and 297 male fall chinook salmon were collected for broodstock from September 16 to November 17, 2002 (Table 13). One hundred eighty-three females and 179 males were spawned from November 6 to November 18, 2002, and an estimated 678,122 green eggs were taken (Appendix F). The mean fecundity was 3,706.

Total prespawn mortality was 0.72% (four females and no males). In comparison, total prespawn mortality for fish held at Three Mile Dam in previous years has ranged from 2.0 to 16.0%.

Collection, Holding and Spawning of Coho Salmon

Coho salmon broodstock were not collected in 2002. Oregon Department of Fish and Wildlife hatcheries supplied all 2002 broodstock eggs for the Umatilla River program.

Table 13. Fall chinook broodstock collection, spawning, and mortality in 2002. /a

Number Collected			Number Spawned						Number of Mortality					
Females	Males	Total	Females	%	Males	%	Total	%	Females	%	Males	%	Total	%
262	297	559	183	69.8	179	60.3	362	64.8	4	1.5	0	0.0	4	0.72

/a The numbers in the table do include three green males and one spawned out female.

Task 2.2: Disease Sampling

Disease Sampling of Summer Steelhead Broodstock

Cell culture assays of the ovarian fluid from four of 36 spawned females were positive for infectious hematopoietic necrosis virus (IHNV) (Table 14). IHNV was also detected in five of 29 pooled pyloric caeca, kidney, and spleen samples (three fish pools) taken from the same females. Assays from 32 spawned males were negative.

Twenty-one prespawn mortalities were sampled for culturable bacteria. Aeromonad-pseudomonad bacteria were detected in sixteen fish. Ten fish had high level infections, three fish had moderate level infections, and three had low level infections. Enteric redmouth disease (*Yersinia ruckeri*) was detected in four fish. One had a high level infection and three had moderate level infections. Mixed bacteria were detected in 10 fish. Three fish had high level infections, and seven fish had moderate level infections.

Disease Sampling of Spring Chinook Salmon Broodstock

The ovarian fluid from 27 of 78 spawned females was positive for IHNV (Table 14). IHNV was also detected in five of 16 pooled pyloric caeca, kidney, and spleen samples (four fish pools) taken from the same females. Kidney samples from 266 spawned females were taken to test for BKD. Two fish had ELISA OD₄₀₅ readings of 0.260 and 0.365, indicating low to moderate level positives. All other fish had negative or very low levels (0.099 or less).

Twenty-one mortalities were sampled for culturable bacteria. One fish had a moderate level of aeromonad-pseudomonad bacteria and enteric redmouth disease (*Yersinia ruckeri*) was detected at a moderate level on one fish. Mixed bacteria were detected in all 21 fish.

Table 14. Results of disease sampling of Umatilla River summer steelhead and spring and fall chinook salmon broodstock in 2002.

Species	Test	Incidence	Comments	
Summer steelhead				
Spawned Fish	Culturable viruses	OF Milt PKS	4/36 0/32 5/29	IHNV No evidence of viral infection IHNV
Mortalities	Mixed culture bacteria		10/21	Three fish had high level infections, and seven fish had moderate level infections.
	Aeromonad-pseudomonad bacteria		16/21	Ten fish had high level infections, three had moderate level infections, and three had low level infections.
	Enteric redmouth disease (<i>Yersinia ruckeri</i>)		4/22	One fish had a high level infection and three fish had moderate level infections.
Spring Chinook				
Spawned Fish	Culturable viruses	OF PKS	27/78 5/16	IHNV IHNV
	Bacterial kidney disease		2/266	Two fish had low to moderate levels of Rs antigen (OD ₄₀₅ readings of 0.260 and 0.365). All others had low to negative levels of Rs antigens (less than 0.099).
Mortalities	Aeromonad-pseudomonad bacteria		1/21	Moderate level infection.
	Enteric redmouth disease		1/21	Moderate level infection.
	Mixed culture bacteria		21/21	
Fall Chinook				
Spawned Fish	Culturable viruses	OF PKS	0/80 0/15	No evidence of viral infection No evidence of viral infection
	Bacterial kidney disease		0/183	All had low to negative levels of Rs antigen (OD ₄₀₅ readings of 0.0 to 0.099).
Mortalities	Bacterial kidney disease		0/2	Both had low to negative levels of Rs antigen (OD ₄₀₅ readings of 0.0 to 0.099).
	Aeromonad-pseudomonad bacteria		2/2	One had a high level infection and one had a moderate level infection.
	Mixed culture bacteria		2/2	

Disease Sampling of Fall Chinook Salmon Broodstock

The ovarian fluid from 80 spawned females and pooled pyloric caeca, kidney and spleen samples (four fish pools) from the same females were negative for replicating viral agents (Table 14). Kidney samples from 183 spawned females were taken to test for BKD. All had ELISA OD₄₀₅ readings between 0.00 to 0.099, indicating negative to low level positives.

Two mortalities were sampled for BKD. Both had OD₄₀₅ readings of 0.099 or less, indicating very low or negative antigen levels. These same two fish were also tested for other culturable bacteria. Aeromonad-pseudomonad bacteria were cultured from the kidneys of both fish as well as mixed bacteria.

Disease Sampling of Coho Salmon Broodstock

Coho salmon broodstock were not collected in 2002. Oregon Department of Fish and Wildlife hatcheries supplied all 2002 broodstock eggs for the Umatilla River program.

Task 2.3: Adult Holding and Spawning Facility Maintenance

Regularly scheduled maintenance and repair was performed at all adult holding and spawning facilities in 2002. Routine facility maintenance work consisted mostly of weed abatement. Project and Umatilla Passage Facility Operation and Maintenance personnel performed critical maintenance and repair. Tasks included: 1) replaced the ozone generator computer boards at South Fork Walla Walla; 2) replaced the ozone monitor electrodes and calibrated the ozone monitors; and 3) cleaned out the domestic waste lines at Three Mile Dam.

Objective 3: Increased Spring Chinook Salmon Production

Task 3.1: Increased Spring Chinook Salmon Production

Funding was provided by BPA directly to the USFWS under a separate contract to produce, mark, and tag 350,000 spring chinook salmon juveniles at LWSH for release in the Umatilla River basin. The actual number of juveniles received from LWSH was 365,058. All fish were adipose fin clipped and 39,842 fish were also left ventral fin clipped and coded-wire tagged. Details of the fish culture and marking activities related to this production are reported directly to BPA by the USFWS.

Although this activity is an objective under this project and the funding is identified as an independent line item in the project budget, its inclusion is extremely confusing. The funding for this activity is contracted directly between BPA and the USFWS and details of work performed are reported directly to BPA by the USFWS. It would be much less confusing and make more sense to have a totally separate contract between BPA and the USFWS for this activity and exclude it from this project's annual Work Statement and Budget.

Objective 4: Increased Adult Spring Chinook Spawners

Task 4.1: Holding and Outplanting Spring Chinook Salmon

A total 168 adult spring chinook (93 females and 75 males) were transferred from Three Mile Dam to South Fork Walla Walla between June 6 and June 23, 2002. On August 8, 162 fish (85 adult females, 69 adult males, and eight jacks) were loaded into a 3,000 gallon transport truck and hauled by Fish Passage personnel and released into the South Fork Walla Walla River to spawn naturally. Adult mortality during the holding period was 7.95% (six males and eight females).

A total 214 adult spring chinook (126 females and 88 males) were transferred from Ringold Hatchery to South Fork Walla Walla between May 21 and June 5, 2002. On August 8, 50 fish (25 adult females and 25 adult males) were loaded into a 750 gallon transport tank and hauled by Fish Passage personnel and released into Mill Creek, a tributary to the Walla Wall River, to spawn naturally. In addition, 121 fish (50 adult males and 71 adult females) were loaded into a 3,000 gallon transport truck and hauled by Fish Passage personnel and released into the South Fork Walla Walla River. Adult mortality during the holding period was 20.9% (13 males and 30 females). This compares to 7.95% mortality for Umatilla River broodstock. The higher losses are thought to be due to the worsened condition of the Ringold fish.

Objective 5: Umatilla Satellite Facilities Planning

Task 5.1: Umatilla Satellite Facilities Review

Meetings with CTUIR, BPA, and ODFW were held to discuss proposal and designs for new Umatilla Hatchery satellite facilities scheduled for completion in the Walla Walla River Basin. Review and comments were provided.

Literature Cited

Rowan, G.R. 1997. Umatilla Hatchery satellite facilities operation and maintenance. Report submitted to Bonneville Power Administration, Project No. 83-435. 52 pp.

Zimmerman, B.C., and B. Duke. 1998. Trapping and transportation of adult and juvenile salmon in the lower Umatilla River in northeast Oregon, 1996-1997. Report submitted to Bonneville Power Administration, Project No.88-022. 41 pp.

APPENDICES

Appendix A. Liberation information for summer steelhead, coho, and spring and fall chinook salmon coded-wire tagged and released in the Umatilla River Basin in 2002.

Species Brood Year	Number Released	Release Date	No./lb.	Number Tagged	CWT Code	Release Location
<u>Summer Steelhead</u>						
2001	54,917	April 2/9	5.1	21,274	093410	Bonifer
2001	47,521	Apr 24/30	4.5	20,422	093412	Minthorn
2001	54,366	Apr 24/30	4.2	21,241	093411	Pendleton
<u>Fall Chinook</u>						
2000	259,607	Mar 1/7	9.0	26,355	093346	Thornhollow
2000	260,957	Apr 4/11	8.7	27,838	093347	Thornhollow
2001	149,453	May 17/23	42.0	146,558	093501	Thornhollow
2001	<u>157,741</u> 307,194	May 17/23	39.3	<u>156,097</u> 302,655	093503	Thornhollow
2001	149,669	May 23	39.0	145,816	093502	Uma. RM 48.5
2001	<u>163,200</u> 312,869	May 23	39.0	<u>158,572</u> 304,388	093504	Uma. RM 48.5
<u>Spring Chinook</u>						
2000	49,095	Feb 2/7	13.7	6,503	092657	Imeques
2000	49,159	Feb 2/7	13.7	6,582	092658	Imeques
2000	<u>49,794</u> 148,048	Feb 2/7	13.7	<u>6,458</u> 19,543	092659	Imeques
2000	53,961	Mar 1/8	13.8	21,450	093360	Imeques
2000	53,756	Mar 1/8	13.8	20,616	093361	Imeques
2000	53,945	Mar 1/8	12.0	21,187	093358	Imeques
2000	50,144	Mar 1/8	12.0	20,657	093359	Imeques
2000	50,412	Mar 1/8	12.3	21,020	093362	Imeques
2000	50,804	Mar 1/8	12.3	20,401	093363	Imeques
2000	<u>50,810</u> 363,832	Mar 1/8	12.3	<u>20,835</u> 146,166	093401	Imeques
2000	143,516	Mar 8/14	17.0	15,993	054662	Imeques
2000	220,725	Apr 4/11	14.9	23,849	054761	Imeques
<u>Coho</u>						
2000	542,475	Mar 2/7	15.6	26,629	093016	Pendleton
2000	27,185	Mar 2/7	14.7	26,437	093010	Pendleton
	222,499	Mar 2/7	14.7	26,433 /a	093327	Pendleton
2000	185,018	Mar 29	14.0	none	none	Pendleton
2000	644,680	Apr 5/17	14.2	26,244	093017	Pendleton

/a CWT and not clipped

Appendix B. Fish Sampled at Westland Canal juvenile facility in 2002. /a

Date	Number of Fish Sampled	Salmonids						Non-game & Warm Water Species
		Marked /b		Unmarked				
		Chinook /b	STS (y)	Coho (sy)	Coho (y)	Chinook	StS (sy)	
July 8	228	25	0	14	25	122	20	22
July 10	213	16	0	5	30	148	3	11
July 12	162	3	1	86	5	37	8	22
Total	603	44	1	105	60	307	31	55

/a The unmarked chinook sampled were believed to be both fall chinook subyearlings and spring chinook yearlings from natural production. y = subyearling, sy = subyearling.

/b All were adipose clipped or CWT.

Appendix C. Umatilla River summer steelhead broodstock collection in 2001-02.

Date Collected	Hatchery		Total Hatchery	Unmarked		Total Unmarked	Total		Total
	Males	Females		Males	Females		Males	Females	
Sep 21				1	1	2	1	1	2
Sep 24	1		1	2	2	4	3	2	5
Oct 2				2	1	3	2	1	3
Oct 8	1		1	1	2	3	2	2	4
Oct 16				1	1	2	1	1	2
Oct 29				2	1	3	2	1	3
Nov 7	1		1	1	2	3	2	2	4
Nov 15				2	2	4	2	2	4
Nov 21				2	1	3	2	1	3
Dec 5	1		1	3	4	7	4	4	8
Dec 17				3	3	6	3	3	6
Jan 3	1		1	3	3	6	4	3	7
Jan 14				3	3	6	3	3	6
Jan 28				2	2	4	2	2	4
Feb 12				3	3	6	3	3	6
Feb 14	1		1				1		1
Mar 4	2		2	8	8	16	10	8	18
Mar 18	1		1	5	6	11	6	6	12
Apr 2	1		1	6	5	11	7	5	12
Total	10		10	50	50	100	60	50	110

Appendix D. Summer steelhead broodstock spawning at the Minthorn adult holding and spawning facility in 2002.

Date Spawned	Fish Number	Sex	Family Number	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Mark	Comments	Green Eggs	Eyed Eggs
Apr 3	1	F	1	755	614	None	live spawned	<u>29,772</u>	<u>21,344</u>
	2	F	1	695	565	None			
	3	F	1	733	594	None			
	4	M	1	735	605	AdLV			
	5	M	1	---	---	None			
	6	M	1	573	462	AdLV			
	7	F	2	602	494	None			
	8	F	2	615	505	None			
	9	M	2	760	603	None			
	10	M	2	653	512	None			
Apr 17	11	F	3	665	555	None		<u>41,146</u>	<u>34,681</u>
	12	F	3	720	600	None			
	13	F	3	755	630	None			
	14	M	3	610	495	None			
	15	M	3	610	510	None			
	16	M	3	535	455	None			
	17	F	4	645	550	None			
	18	F	4	670	575	None			
	19	F	4	650	555	None			
	20	M	4	725	595	None			
	21	M	4	630	510	None			
	22	M	4	640	530	None			
	23	F	5	630	530	None			
	24	F	5	610	520	None			
	25	F	5	650	560	None			
	26	M	5	575	475	None			
	27	M	5	620	505	None			
	28	M	5	635	535	None			
Apr 24	29	F	6	760	638	None		<u>11,040</u>	<u>9,456</u>
	30	F	6	614	499	None			
	31	M	6	545	444	None			
	32	M	6	648	513	None			

Appendix D cont.

Date Spawned	Fish Number	Sex	Family Number	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Mark	Comments	Green Eggs	Eyed Eggs
May 1	33	F	7	604	501	None		<u>16,029</u>	<u>11,123</u>
	34	F	7	643	525	None			
	35	M	7	690	556	None			
	36	M	7	638	499	None			
	37	F	8	662	534	None			
	38	M	8	626	506	None			
May 8	39	F	9	610	510	None		<u>31,261</u>	<u>24,369</u>
	40	F	9	605	510	None			
	41	F	9	730	610	None			
	42	M	9	620	510	None			
	43	M	9	645	530	None			
	44	M	9	670	540	None			
	45	F	10	600	500	None			
	46	F	10	575	480	None			
	47	F	10	610	510	None			
	48	M	10	560	460	None			
	49	M	10	680	555	None			
	50	M	10	570	470	None			
	51	F	11	640	540	None			
	52	M	11	570	465	None			
May 15	53	F	12	610	510	None		<u>14,959</u>	<u>9,720</u>
	54	F	12	710	600	None			
	55	F	12	610	510	None			
	56	M	12	600	490	None			
	57	M	12	600	490	None			
	58	M	12	575	470	None			
May 22	59	F	13	---	575	None		<u>18,050</u>	<u>12,540</u>
	60	F	13	622	523	None			
	61	F	13	---	608	None			
	62	M	14	600	492	None			
	63	M	14	649	527	None			
	64	M	14	592	484	AdLV			

Appendix D cont.

Date Spawned	Fish Number	Sex	Family Number	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Mark	Comments	Green Eggs	Eyed Eggs
May 29	65	F	15	602	503	None			
	66	F	15	606	509	None			
	67	M	15	610	489	None			
	68	M	15	581	483	None		<u>10,912</u>	<u>7,936</u>
June 5	69	F	16	620	520	None			
	70	F	16	572	485	None			
	71	M	17	658	535	AdLV			
	72	M	17	625	510	None		<u>7,786</u>	<u>4,469</u>
							Total	180,955	135,638
							Fecundity	5,027	

Appendix E. Spring chinook salmon broodstock spawning and mortality at South Fork Walla Walla in 2002. /a

Date	Number of Fish Spawned		No. Green Eggs Taken	No. Eyed Eggs Taken	Number of Mortality	
	Females	Males			Females	Males
May 28					1	
June 12					1	1
June 16						1
June 26					1	
July 9					2	
July 12					1	
July 19					1	
July 26					1	
July 29						1
Aug 5					1	
Aug 19					1	
Aug 21	10	10	35,932	32,500		
Aug 28	68	65	278,412	238,000		
Sept 4	132	130	505,381	423,625		
Sept 9					1	
Sept 11	56	36	197,388	175,500	2	2
Total	266	241	1,017,113	869,625	13	5

/a The numbers in the table do not include one green male and one spawned out female that were killed for spawning but were not used. The numbers do include two partially green females that eggs were taken from.

Appendix F. Fall chinook salmon broodstock spawning and mortality at Three Mile Dam in 2002. /a

Date	Number of Fish Spawned		No. Green Eggs Taken	No. Eyed Eggs Taken	Number of Mortality	
	Females	Males			Females	Males
Nov 6	39	38	153,742	123,250	3	
Nov 12	72	69	266,100	187,372	1	
Nov 14	40	40	146,680	115,304		
Nov 18	32	32	111,600	81,381		
Total	183	179	678,122	507,307	4	

/a The numbers in the table do not include three green males and one spawned out female. Two of the female mortalities were accidentally killed in the bulkhead gate.